Number 21 Series 1926

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF CHEMISTRY AND SOILS
In cooperation with the Tennessee Department of Education
Division of Geology

SOIL SURVEY
OF
HARDIN COUNTY, TENN.

BY

W. J. LATIMER, in Charge, J. A. KERR, A. L. GRAY,
J. W. MOON, and A. W. GOKE

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CONTENTS

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COUNTY SURVEYED

Hardin County is in the southwestern part of Tennessee. Its southern boundary adjoins both the Mississippi and Alabama State lines. The county is roughly rectangular in shape, measuring approximately 22 miles from east to west and 30 miles from north to south. The total area of 589 square miles or 376,960 acres includes 9 square miles or approximately 6,000 acres in the Shiloh National Military Park.

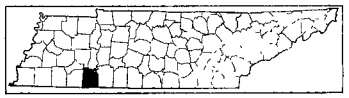

FIGURE 1.—Sketch map showing location of Hardin County, Tenn.

Physiographically the county lies on the boundary between the highland rim on the east and the coastal plain or Gulf embayment on the west. These two regions are separated by the broad but deeply intrenched valley of Tennessee River, which crosses the county north and south somewhat west of its geographical center. The highland rim is a severely dissected plateau which slopes gently westward. It is cut by numerous stream valleys ranging from 1 mile in width near their entrance to the Tennessee River Valley to one-fourth mile in their upper reaches where the elevation is from 350 to 500 feet above sea level. The intervening ridges have fairly steep sides and are narrow and of a hogback relief along the river valley edge but have comparatively flat tops in the eastern and southeastern parts of the county. The ridges range from 600 feet above sea level in the western part of the plateau to 880 feet in the eastern part. The coastal plain represents a dissected plateau lying from 400 to 600 feet above sea level. It is cut by shallow stream valleys averaging 1 mile in width along the larger streams. In only a few places on ridges standing from about 100 to 250 feet above the level of the old terraces of Tennessee River can the former level of the coastal plain be seen. Old fairly level or gently undulating river terraces cut by innumerable small stream valleys, leaving the remnants of the terrace as low somewhat flattened ridges standing from about 100 to 150 feet above stream level, now cover most of the coastal-plain section of the county.

The Tennessee River Valley, the outstanding physical feature of the county, together with the flood plains and terraces ranges from 5 to 10 miles in width. The flood plain averages about 2 miles in width through the upper or southern three-fourths of its length and 1 mile through the remainder of the county. The elevation of the river level is 300 feet above sea level at the northern edge of the county and about 350 feet at the south edge. This shows a drop of 50 feet in the 50 miles that the river flows in its meandering

107936—30——1

course through the county. The river bottoms average about 30 feet above stream level and are flanked in places by fairly broad level terraces that stand about 100 feet above the river. The most extensive terraces are near the center of the county between Tennessee River and Horse Creek and west of Tennessee River.

Hardin County is drained by Tennessee River and its tributaries. Numerous springs, which furnish an abundant supply of water even in dry seasons, emerge from the hills along the stream valleys. Most of the larger streams have cut well down toward base level and flow in meandering courses through broad well-developed bottoms. Some of the smaller streams are still cutting back into the plateaus. Although the currents are not swift, there is enough fall to develop water power through the use of dams. The streams entering Tennessee River from the east are much swifter flowing than those entering from the west.

Approximately 70 per cent of the county is forested. The growth differs considerably with the physiographic divisions. The terraces are covered for the most part by a second growth of post oak, with black gum and sweetgum in low places and few other forest trees and little underbrush. The forest on the bottom land includes white oak, willow oak, birch, willow, hickory, cottonwood, ash, cypress, hackberry, black gum, sweetgum, elm, and ironwood, with alder, briers, and cane in the underbrush. On the side hills of the upland oaks (red, white, black, and chestnut), beech, poplar, hickory, cedar, persimmon, dogwood, maple, ash, and walnut grow, and on the tops of the ridges are many post oak and shortleaf pine trees. A line extending north and south through the center of the county divides it into two forest regions, hardwoods on the west and mixed hardwood and pine on the east.

Hardin County was formed in 1819. The first settlements in this region were made in the vicinity of Hardin Creek in 1816 by settlers from eastern Tennessee. Other pioneers, mainly English and Scotch-Irish from Virginia, Maryland, Pennsylvania, and the Carolinas, followed rapidly. The present inhabitants are descended from the original inhabitants and from slaves owned by the river-bottom planters.

The population in 1920 was 17,291, all classed as rural. The density is 29.7 persons to the square mile. The percentage of white people is 88.8 and of colored 11.2. Most of the inhabitants are engaged in agriculture and timbering.

Savannah, the county seat and largest town, had a population of 758 in 1920. It is the trading point for a large part of the county and the shipping point for lumber, ties, cotton, and corn.

No railroads enter the county. The nearest railroad stations are at Selmer, Tenn., which lies at a distance of 26 miles, and Corinth, Miss., 30 miles away. Both points are reached by gravel roads. Tennessee River, which is navigable throughout the year, furnishes an artery of transportation through the middle of the county. Six ferries are in operation across Tennessee River within the county, and a bridge across it is in course of construction at Savannah.

A number of the main roads have been improved and graveled, but the secondary roads are poor. Schools are located in all parts of the county, and nearly every community has telephone service.

Savannah and Saltillo in Hardin County, Clifton in Wayne County, Selmer in McNairy County, Corinth, Miss., Florence, Ala., and Paducah, Ky., are the principal markets for agricultural products.

CLIMATE

In general, the climate of Hardin County is humid and mild. The winters, though marked by occasional cold spells, are comparatively open with only a light snowfall. The summers are fairly long and hot. Maximum and minimum temperatures of 106° F. and —12° have been reached. The average annual precipitation of 50.98 inches is well distributed throughout the year, the lightest rainfall occurring in the fall.

The average frost-free season is about six and two-thirds months, from April 5 to October 26, inclusive. This affords ample time for all crops common to this section to mature. The latest and earliest recorded killing frosts, respectively, were on May 2 and September 30. Climatic conditions are favorable for growing general farm crops and truck crops and for livestock raising.

Table 1, compiled from the records of the United States Weather Bureau station at Savannah, gives the normal monthly, seasonal, and annual temperature and precipitation in Hardin County.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Savannah*

[Elevation, 442 feet]

Month	Temperature			Precipitation		
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1895)	Total amount for the wettest year (1890)
	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*
December	42.1	78	0	5.08	3.79	5.31
January	40.7	79	−12	5.04	5.06	8.20
February	42.6	81	−10	4.55	.76	10.32
Winter	41.8	81	−12	14.67	9.61	23.83
March	51.9	87	6	5.54	4.63	9.30
April	60.5	90	25	4.74	1.67	4.14
May	68.8	96	32	4.30	1.22	4.06
Spring	60.4	96	6	14.58	7.52	17.50
June	75.9	105	45	4.43	4.10	4.54
July	79.0	105	50	4.47	6.56	.39
August	78.5	106	50	3.49	3.25	7.68
Summer	77.8	106	45	12.39	13.91	12.61
September	72.3	103	33	3.15	2.00	8.50
October	61.0	97	25	2.46	1.73	2.34
November	50.2	84	10	3.73	4.37	1.76
Fall	61.2	103	10	9.34	8.10	12.60
Year	60.3	106	−12	50.98	39.14	66.54

AGRICULTURE

Agriculture, during the settlement of Hardin County, consisted of the growing of general farm crops, such as corn, wheat, and oats, with some vegetables and sorghum, and the raising of cattle and hogs. During this period the farms supplied all the food needed. Cotton and legumes were introduced later. The acreage of corn increased and that of the smaller grains, especially wheat, decreased.

At present corn is the leading crop, especially on the river-bottom and creek-bottom lands. Cotton ranks next in importance and is grown mainly on the uplands and terraces but to some extent on bottom land. These two crops are the chief sources of revenue to the farmers. Soybeans, cowpeas, and a small acreage of clover, redtop, timothy, and other grasses are cut for hay. Some wheat and oats are grown. Most of the oats are cut as green forage. Nearly 12,000 acres are devoted to hay and forage crops and slightly less than 1,500 acres to minor crops, such as oats, barley, peas, beans, peanuts, potatoes, sweetpotatoes, other vegetables, and sorghum. Table 2 gives the leading crops with their acreage and production in 1919.

TABLE 2.—*Acreage and production of principal crops in Hardin County, Tenn., 1919*

Crop	Acres	Production
		Bushels
Corn	43,298	983,758
Wheat	1,168	10,736
		Tons
All tame or cultivated grasses	6,107	5,634
Grains cut green	1,066	663
Legumes cut for hay	4,728	3,682
		Bales [1]
Cotton	18,387	6,897

[1] Ginners' reports give the 1925 cotton crop as 7,186 bales.

Orcharding is not important, though most farmers have small orchards of apples, mainly of summer varieties, peaches, pears, plums, and grapes. In 1919 the bearing trees included 18,033 apple trees yielding 14,560 bushels, 30,695 peach trees yielding 42,049 bushels, 1,194 pear trees yielding 688 bushels, 3,567 plum trees yielding 1,308 bushels, 419 cherry trees yielding 102 bushels, and 1,166 grapevines yielding 8,781 pounds.

A few milk cows, to furnish milk and butter for home use and a small surplus of butter for sale, are kept on nearly all farms. A few farmers sell milk and cream. The beef cattle kept are for the most part poor stock. A few sheep are raised, and hogs and chickens are kept on most farms. The 1920 census credited Hardin County with 8,432 dairy cattle, 3,325 beef cattle, 24,111 hogs, and 113,503 chickens.

Table 3 gives the value of all agricultural products by classes in 919.

TABLE 3.—*Value of agricultural products in Hardin County, Tenn., 1919*

Crop	Value	Livestock and products	Value
Cereals	$1,801,653	Animals sold and slaughtered [1]	$697,922
Other grains and seeds	8,447	Dairy products, excluding home use	163,471
Hay and forage	312,248	Poultry and eggs	220,177
Vegetables	214,166	Wool, mohair, and goat hair	1,570
Fruit and nuts	110,841		
All other crops	1,351,517	Total	1,083,140
		Total agricultural products	4,882,012
Total	3,798,872		

[1] Estimated.

Farm buildings and equipment are only fair, but most of them are suited to the prevailing methods of farming. A few shacks and tool sheds are practically the only buildings on the river bottoms, the residences and principal farm buildings being on the uplands. The prevailing farm equipment consists of 2-horse and single-draft turn plows, disk, spike-tooth, and spring-tooth harrows, mowing machines, corn and cotton planters, spike-tooth cultivators, middle busters, a bull tongue, and an assortment of sweeps. The equipment is generally adequate for the cultivation of cotton and corn. Some of the better farmers have tractors, sulky plows and cultivators, and grain and fertilizer drills. The 2-horse wagon is in common use, but some farmers use 1-horse wagons.

Most of the work animals are mules. In 1920, 5,559 mules and 2,251 horses were on the farms of the county.

The average value of all farm property on the 2,907 farms in the county in 1920 was $3,405 a farm and the percentage of this amount represented by land was 62.3; by buildings, 14.2; by implements, 4.6; and by domestic animals, 18.9.

The surface features and character of the soils have had a strong influence on the distribution of crops. Corn is grown mainly on the bottom lands. Cotton, although grown to some extent on the bottom lands, is produced mainly on the terraces and to less extent on the hill land. Hay is grown for the most part in the bottoms, and all other crops are planted mainly on the terraces or hill land.

Farming methods followed in the past, including clean cultivation and continuous cropping without returning organic matter to the soil, have resulted in almost complete exhaustion of organic matter except in some of the lower bottom-land soils which are subject to periodic inundations. On only a few farms, and there only on special patches, has manure been used, and very seldom is organic matter other than stubble, turned under. Liming is not practiced. Generally the cornstalks are stripped of blade or fodder and are topped. The cotton is ginned at local gins, a number of which are in the county. The surplus corn is sold, but hay is fed largely to work animals.

No systematic crop rotation is followed, nor is it possible under the present system of planting such large areas of certain soils to one crop to follow a definite rotation. On the terrace, upland, and high bottom land rotations are feasible, and some of those suitable to this section of the country should be followed.

In general farmers on the bottom lands do not use fertilizer. In 1919, the use of fertilizer was reported on 40.6 per cent of the farms, and the total expenditure for this material was $43,588 or $36.91 a farm. Farmers on the uplands use most of the fertilizer on cotton but some on wheat and oats. Most of the fertilizer used on cotton consists of superphosphate (acid phosphate), kainit, and cottonseed meal, and commercial grades ranging from 2–10–2 [1] to 4–10–4, applied in quantities ranging from 50 to 500 pounds to the acre. Nitrate of soda is used as a top-dressing for small grain, and small amounts of phosphoric acid are used on upland corn. The small quantity of manure available is applied to small patches of special crops and gardens on the upland.

Most of the farm labor is performed by the farmer and his family. Most of the farm laborers are white, except in certain sections of the river bottoms. In 1919, 35.4 per cent of the farmers reported hiring labor at an average cost of $65.13 a farm. The price paid laborers is $30 a month, with board, or from $1.25 to $1.50 a day, without board. The best class of labor is paid from $2 to $2.50 a day on public works.

Most of the farm land in Hardin County is held in large tracts, some plantations including as much as 5,000 acres. The average size of farms, as reported by the 1920 census, is 79.1 acres, but each tenancy is considered as a farm. In 1920, 44.3 per cent of the farms were operated by the owners and the remainder by tenants. Most farms are rented on the share basis, the terms of tenure differing considerably with the character of the land. The river-bottom land rents for one-third of the corn, one-fourth of the cotton, and one-half of the hay, and the upland is usually rented for one-half of all crops. A 1-horse farm consists of 15 acres in stream bottoms and about 20 acres in the upland. Most renters work from 2-horse to 6-horse farms.

In 1920, the average value of farm land was $26.95 an acre. The river-bottom land ranges in price from $50 to $100 an acre. The terrace land, much of which is more favorably situated for dwellings, is cut into small farms and sells at prices ranging from $20 to $150 an acre, according to location. Where cleared the hill land brings from $10 to $20 an acre, and where uncleared the price depends on the value of the timber.

SOILS

The soils of Hardin County have developed under humid climatic conditions and a forest flora similar to that of other Southeastern States. The soil-forming processes are not only conducive to active weathering and breaking down of the soil particles but they also favor leaching of the soluble soil constituents, free carbonates, and soluble salts, nearly as rapidly as the decomposition of mineral and organic materials. The insoluble materials together with the finer soil particles have been carried down by eluviation and accumulated in the subsoil. This process has been effective to a depth of 3 or 4 feet. Below this depth there is evidence of the incomplete weather-

[1] Percentages, respectively, of nitrogen, phosphoric acid, and potash.

ing of the parent formation to a depth ranging from 6 to 10 or more feet. It is on this material that the present soil-forming processes are operating.

As the result of these processes, soils having a mature profile have developed on the well-drained level or gently undulating uplands. The mature soils under forest conditions are covered by a very thin surface layer of organic matter or leaf mold mixed with soil material. This layer is underlain by the A_1 horizon of shallow dark-gray or dark yellowish-gray light soil, mixed with organic matter, which grades at a depth of 1 or 2 inches into the A_2 horizon of gray, grayish-yellow, or pale yellowish-brown floury material which extends to a depth of 5 or 6 inches, at which depth it grades into the B_1 horizon of buff-colored, yellowish-brown, yellow, reddish-yellow, or yellowish-red firm friable heavier-textured material. At a depth of 18 or 20 inches the B_1 horizon passes into the B_2 horizon of compact yellowish or reddish friable similar-textured material faintly mottled with yellow and gray. This grades downward into the imperfectly weathered parent material, the C horizon, consisting of yellow or yellowish-red material, in most places mottled with yellowish brown and gray. This is commonly lighter in texture and less compact than the B horizon. Some of the old level plateau soils and level terraces, in which the B_2 horizon is intensely compact and highly mottled, are almost postmature.

The immature soils have yellowish-brown or grayish-brown surface soils and heavier firm but not compact reddish subsoils which grade at a depth of 24 inches into imperfectly weathered firm but not compact parent material. Some of the younger soils have weathered to a comparatively slight depth, but the weathered material very closely resembles the parent material. In some intermediate stages of development weathering or partial weathering is deep and oxidation is far advanced, but comparatively little leaching has taken place. The recently deposited soils have not lain long enough to develop well-defined soil profiles.

The parent materials from which the soils have weathered are as follows: (1) Residual rock, limestone, chert, sandstone, and shale; (2) unconsolidated sands, silts, clays, chalk, and gravel; (3) terraces or old alluvium derived from both limestone and freestone material; and (4) recent flood-plain deposits derived from hard limestone and freestone rocks. Soils derived from the limestones differ considerably according to the lithologic character of the material. Differences in color are owing to degree of weathering, oxidation, and leaching or eluviation. Owing to topographic position and the ready solubility of the limestones the resultant soils rarely reach maturity. Differences in soils of the second class are owing mainly to the lithologic character of the material and to oxidation. Large areas of this class of soil have reached maturity, but little postmature soil is found. Most of the soils in the third group have reached maturity and border on postmaturity. Most of these soils along the edges, where erosion and aeration are active, can be considered as immature. The soils of the fourth class differ with the character of the deposit and with drainage conditions, very little of the material having a definite profile development.

The distribution of the soils in this county is largely determined by the outcrop or distribution of the parent material. The entire area, with the exception of eroded tracts, is covered by a comparatively thin mantle of gravel, sand, and clays (geologically classed as Tuscaloosa gravel, Eutaw sand, and Selma chalk) of Cretaceous age that were deposited during the Gulf embayment period. Tuscaloosa gravel and Eutaw sand covered a large part of the county, and Selma chalk occurred in only a small area in the northwestern part. In the eastern half of the county the limestones outcrop where the overlying sands and gravel have been washed off. In the southeastern part of the county only the upper or siliceous members, including the cherts, impure limestone, and sandstones of the St. Louis, Tullahoma, and Devonian formations, are exposed. In the northeastern part erosion has more effectively removed large quantities of the uppermost deposits, members of the Cretaceous and Mississippian age, thus exposing the comparatively pure limestones of Silurian age. Large areas of the Cretaceous formations in the western and central parts of the county have been cut away by Tennessee River and its tributaries, and extensive terraces and large areas of the present flood plain have been laid down at different levels.

Physiographically, the soils of Hardin County are divided into the four following groups: (1) Highland-rim and limestone-valley or residual soils which have weathered directly from the parent rock material; (2) coastal-plain soils residual from redeposited unconsolidated material; (3) terrace or old alluvial soils; and (4) recent alluvial or present flood-plain soils.

For convenience in mapping and description the soils are divided into series, the soils of each series having in general these common characteristics: Mode of formation; soil profile characteristics such as color, structure, and arrangement of the different soil layers; and topographic forms and drainage conditions. The members of each series, the soil types, differ from each other in the texture of the surface soil; that is, in the proportion of the different grades of soil particles, as sand, silt, or clay, present.

The soils of Group 1 are included in the Baxter, Hagerstown. Hardin, and Fairmount series; those of Group 2 in the Cuthbert, Ruston, Luverne, Guin, Susquehanna, Oktibbeha, and Pheba series; those of Group 3 in the Cumberland, Elk, Savannah, Cahaba, Kalmia, and Robertsville series; and of Group 4 in the Huntington, Lindside, Holly, Ochlockonee, and Bibb series.

The soils of the Cuthbert series represent the normal mature soil of the upland coastal plain. These soils have been developed in gently undulating positions and are well drained and aerated. They have gray or yellowish-gray light floury surface soils, reddish-yellow firm but friable upper subsoil layers, compact yellowish-red friable lower subsoil layers (the zone of concentration) which become lighter in texture and less compact with depth, and substrata of unconsolidated beds of sands and clays of the coastal-plain deposits. Cuthbert very fine sandy loam with a rolling phase is the only soil of the Cuthbert series mapped.

The soils of the Luverne series resemble those of the Cuthbert in general profile, having compact lower subsoil layers which, how-

ever, in the Luverne soils are much redder owing, probably, to better aeration and high oxidation. The Luverne soils seem to be derived from slightly coarser-textured parent material, and this is possibly responsible for the better aeration as there is little difference in the relief and general drainage conditions of the soils of the two series. Luverne very fine sandy loam is mapped.

Soils of the Ruston series differ from the Cuthbert soils mainly in age. They are apparently younger soils and are less compact in the lower part of the subsoil. This may be owing in some measure to the generally lighter texture of the parent material. These soils are well drained and aerated. Ruston fine sandy loam with a rolling phase and Ruston gravelly fine sandy loam with a broken phase are mapped.

The soils of the Guin series include undifferentiated areas of Ruston, Cuthbert, and Luverne soils which are rolling, broken, and hilly and are in general considered nonagricultural. Guin fine sandy loam and Guin gravelly sandy loam are mapped.

The profiles of soils of the Susquehanna series resemble in some respects those of the Oktibbeha soils. Below the B_1 horizon the material is much heavier and contains more red mottles, and the material of the C horizon consists of noncalcareous clays which grade into imperfectly formed soft shale. The soil is acid throughout. Susquehanna very fine sandy loam is mapped.

The soils of the Oktibbeha series represent the mature soils derived from the Selma chalk formation. They have gray or yellowish-gray thin surface soils, reddish-brown sticky upper subsoil layers, and brownish-yellow or olive-yellow heavy lower subsoil layers passing below into white calcareous clay. This clay, from which the present soil has developed, was weathered from a soft limestone or chalky formation. Oktibbeha silty clay loam, together with its broken phase and greensand phase, is mapped.

Soils of the Pheba series are postmature soils derived from the Selma chalk. The soil profile is similar to that of the Savannah soils, with the exception that the C horizon of the Pheba soils is derived from chalky calcareous material and of the Savannah soils from cherty and quartzite gravel cemented with ferruginous material. Pheba silt loam is mapped.

The soils of the Hagerstown series have reached a less advanced stage of maturity than the Pheba soils. They are weathered from comparatively pure limestone. The surface soil is brown, friable, and deep, and the subsoil is yellowish brown or brown, becoming heavier and red in the lower part. Weathering is fairly deep. Hagerstown silt loam is mapped.

The soils of the Fairmount series are also derived from limestone. They have immature greenish or olive-yellow very shallow heavy clay surface soils and greenish-yellow subsoils. The materials, especially of the light-colored subsoil, are highly calcareous, whereas the other limestone soils have lost nearly all their free carbonates. Drainage is retarded to a marked extent by the density of the subsoil material. These soils are highly plastic and tenacious when first cut but present a seemingly coarse granular structure when dry Fairmount silty clay loam is mapped.

107936—30——2

The surface soils of members of the Hardin series resemble those of the Ruston soils. The subsoils are derived from limestone and consist of undifferentiated Hagerstown and Fairmount material. Hardin fine sandy loam is mapped.

The soils of the Baxter series are derived from impure or highly siliceous limestones and sandstones. They have gray surface soils, predominantly red subsoils, and a substratum consisting mainly of chert fragments and unweathered limestone. These are fairly young soils. Baxter gravelly loam is mapped.

The soils of the Cumberland series represent the mature or nearly mature soils of the Tennessee River terraces. They are derived from limestone material and have developed under good drainage conditions. They have brown floury surface soils which are underlain at a slight depth by yellowish-red or reddish-brown firm but friable somewhat heavier-textured upper subsoil layers which grade imperceptibly into the compact brownish-red or red lower subsoil layer. Below a depth of 3 feet the subsoil material gives way to partly disintegrated gravel and gritty clay material, which in turn passes into cherty gravel tightly cemented with ferruginous material little influenced by weathering. These soils are not so red as typical Cumberland soils mapped elsewhere. Cumberland silt loam is mapped.

The soils of the Savannah series represent the well-matured or postmature soils of the county. These soils are developed on the Tennessee River terraces. In the early stages of soil development the underdrainage on the more level areas may have been slightly retarded by the tightly cemented substratum, as is indicated by the presence of gray mottles in the lower part of the compact subsoil. The surface soils are gray or yellowish gray in color and floury in consistence. The subsoil is yellow or buff-colored firm but friable material, which becomes mottled with gray before reaching the compact lower subsoil at a depth of about 20 inches. The lower subsoil layer is very compact, is mottled yellowish brown, gray, and red, and has laminated gray clay planes cutting at various angles. These planes divide the layer into blocks several inches across. The thickness of the clay planes depends on the age of the terrace and the extent to which eluviation has taken place. The substratum passes into a stratum of tightly cemented gravel. These soils are derived from an overwash strongly influenced by limestone. Savannah silt loam, together with its rolling, eroded, and high phases, is mapped.

The soils of the Elk series are intermediate between those of the Cumberland and Savannah series. They have brown floury surface soils, yellowish-brown firm but friable upper subsoil layers, and reddish-yellow or yellowish-brown deep subsoil layers which grade into gravelly more or less cemented substrata. These soils are derived from limestone and other materials. Elk silt loam is the only soil of the series mapped.

The soils of the Robertsville series are poorly drained and poorly aerated; consequently mottling of gray, yellow, and brown occurs throughout the soil profile. Robertsville silt loam is mapped.

The Cahaba soils have brown or grayish-brown mellow surface soils, yellowish-brown or brown firm but friable subsoils, and yellowish-red friable substrata. They occur as second bottoms on terraces along the streams which drain coastal-plain soils principally. Cahaba fine sandy loam is mapped.

The Kalmia soils occur on terraces along streams that derive their wash almost entirely from coastal-plain material. In drainage conditions they are intermediate between the Robertsville and the Savannah soils, but they occupy much lower terraces, are derived from slightly different materials, and undoubtedly are of more recent geologic age. These soils are characterized by well-drained surface soils and poorly drained subsoils. The poor subdrainage gives rise to a strong mottling of gray, yellow, and brown in the B_2 and C horizons. The silt loam is the only member of the Kalmia series mapped.

The soils of the Huntington series are first-bottom soils occurring along Tennessee River and other streams that receive wash mainly from limestone material. They are comparatively young and have no well-developed soil profile except on some of the older higher-lying bottoms. The surface soil in general is brown, mellow, and comparatively deep. It is underlain by a yellowish-brown firm friable but mellow subsoil that grades downward into yellowish-brown or yellow material showing some faint gray mottles but changing very little in texture or structure. The soil throughout is mildly acid or neutral in reaction. The Huntington series is represented in Hardin County by the silt loam with a high phase and a dark-brown phase, the fine sandy loam with a gravelly phase and a high phase, and the silty clay loam.

The soils of the Lindside series closely resemble those of the Huntington series in the upper part and those of the Holly series in the lower part of the soil profile. Lindside silt loam with a high phase and Lindside silty clay loam with a low phase are mapped.

The soils of the Holly series occur as poorly drained low level areas or swales in the river bottoms. The soil material is derived largely from limestone. The entire soil is strongly mottled with yellow, brown, and gray. Holly silt loam and Holly silty clay loam with a high phase are mapped.

The soils of the Ochlockonee series have the same general profile as the Huntington soils, with the exception that more gray mottles are present in the lower part of the subsoil of the Ochlockonee soils. The Ochlockonee soils are formed almost entirely from sediment brought down from the upland soils derived from coastal-plain material. Ochlockonee very fine sandy loam and Ochlockonee silt loam are mapped.

The soils of the Bibb series are composed chiefly of sediments washed from upland soils of coastal-plain origin. These soils are strongly mottled with gray, yellow, and brown, either throughout the entire profile or below a depth of 6 or 8 inches. Bibb silt loam and Bibb very fine sandy loam are mapped. Both the Ochlockonee and Bibb soils are strongly acid.

In addition to the soil series described, two classes of miscellaneous nonagricultural material, rough stony land and river wash, are mapped.

The soils of the county are described in detail in the following pages of this report, and their agricultural importance is discussed; their distribution is shown on the accompanying soil map; and their acreage and proportionate extent are given in Table 4,

TABLE 4.—*Acreage and proportionate extent of the soils mapped in Hardin County, Tenn.*

Type of soil	Acres	Per cent	Type of soil	Acres	Per cent
Cuthbert very fine sandy loam	38,784	11.2	Robertsville silt loam	960	0.3
Rolling phase	3,520		Cahaba fine sandy loam	1,984	.5
Ruston fine sandy loam	2,368	1.2	Huntington silt loam	24,192	7.9
Rolling phase	2,304		High phase	3,456	
Ruston gravelly fine sandy loam	10,688	5.5	Dark-brown phase	2,432	
Broken phase	10,112		Huntington silty clay loam	2,944	.8
Luverne very fine sandy loam	1,664	.4	Huntington fine sandy loam	7,296	4.0
Guin fine sandy loam	61,120	16.2	Gravelly phase	7,232	
Guin gravelly sandy loam	6,592	1.8	High phase	576	
Susquehanna very fine sandy loam	2,112	.6	Lindside silt loam	2,624	2.6
Oktibbeha silty clay loam	576	.5	High phase	7,232	
Greensand phase	960		Lindside silty clay loam	6,784	4.6
Broken phase	320		Low phase	10,624	
Pheba silt loam	3,200	.9	Holly silt loam	2,368	.6
Hagerstown silt loam	12,416	3.3	Holly silty clay loam	4,480	1.4
Fairmount silty clay loam	1,344	.4	High phase	704	
Hardin fine sandy loam	1,600	.4	Ochlockonee very fine sandy loam	10,048	2.7
Baxter gravelly loam	43,200	11.5	Ochlockonee silt loam	2,752	.7
Cumberland silt loam	11,200	3.0	Bibb silt loam	3,328	.9
Savannah silt loam	24,832	12.7	Bibb very fine sandy loam	5,248	1.4
High phase	13,888		Rough stony land	2,432	.6
Rolling phase	8,704		River wash	64	.1
Eroded phase	512				
Elk silt loam	2,048	.5	Total	376,960	
Kalmia silt loam	3,136	.8			

CUTHBERT VERY FINE SANDY LOAM

In forested areas the 2 or 3 inch surface layer of Cuthbert very fine sandy loam is grayish-brown material mixed with organic matter. It is underlain by a layer, a few inches thick, of light grayish-brown mellow single-grained mealy light very fine sandy loam that rests on yellowish-brown or buff-colored heavy firm but friable very fine sandy loam grading at a depth of 10 or 12 inches into dull-red or yellowish-red firm but friable very fine sandy clay which becomes compact at a depth of about 24 inches. The compact layer, although very hard when dry, crushes with moderate pressure. Below a depth of 30 inches the material contains some fine sand, is dull red, and is more friable and slightly less compact than the layer above. Some yellow mottles occur below a depth of 20 inches. In cleared fields the surface soil is yellowish-brown or reddish-brown very fine sandy loam to a depth ranging from 3 to 10 inches. This is underlain by dull-red or yellowish-red very fine sandy clay. Some variations, caused mainly by differences in surface relief, occur. The soils of the better-drained or more rolling areas are redder and those of the smoother areas are more predominantly reddish-brown or buff to a depth of 20 inches and more mottled below this depth.

This soil occurs on gently undulating or rolling uplands and fairly smooth ridge tops. Drainage is well established, and the soil is fairly retentive of moisture. It is deficient in organic matter and is acid throughout. It is well distributed over the county, occurring in scattered areas on the ridge tops and to less extent around the base of hills. The largest areas lie west of Saltillo and in the southeastern part of the county.

Cuthbert very fine sandy loam is one of the important soils in acreage and potential value. Probably less than 30 per cent is cleared and used for agriculture. Most of the cleared land lies on the west side of Tennessee River. The growth on wooded areas west

of Tennessee River consists of hardwoods in which white oak predominates, with scattered pine and hickory. The dominant growth on the remaining areas is pine with scattered oaks.

Cotton is the leading crop, but corn, wheat, oats, sorgo (sweet sorghum), cowpeas, soybeans, and potatoes are grown in small patches. There are some small home orchards in which peaches predominate but in which a few apples, mainly of summer varieties, are grown. Crop yields are fair. Cotton yields from one-half to 1 bale to the acre, corn from 25 to 35 bushels and more on some of the better-farmed fields, wheat from 10 to 15 bushels, and oats from 15 to 25 bushels. Both cowpeas and soybeans do well.

Small amounts of fertilizer are used on this soil for cotton, but as a rule other crops are not fertilized except on the better farms. From 100 to 300 pounds of superphosphate and cottonseed meal or an equivalent amount of a commercial mixture is used. The soil is mellow and forms a good seed bed with little cultivation. In places where erosion has removed most of the surface soil, leaving the clay close to the surface, the soil has a tendency to clod when plowed.

The selling price of Cuthbert very fine sandy loam differs considerably with location, improvements, and forest growth. Cut-over land in isolated areas sells for $10 an acre. Moderately good cleared land in improved farms sells at prices ranging from $20 to $60 an acre, and some of the better-situated land brings $100 an acre.

This is a fairly strong soil and where properly handled and fertilized will produce good crops of cotton, small grains, potatoes, and vegetables. As this is only a fair corn soil, it is not advisable to plant this crop if bottom land is available. However, good yields can be obtained if the land is properly handled. This soil will hold improvements better than some of the lighter soils.

Cuthbert very fine sandy loam, rolling phase.—The rolling phase of Cuthbert very fine sandy loam differs from the typical soil mainly in having a much more broken and rolling surface. Consequently it is less suited to farming. Most of the land is in forest, consisting mainly of pine with a few scattered hardwoods in the southeastern part of the county and of hardwoods in other sections. Small areas which have been cultivated have suffered from erosion, and many fields have been abandoned.

This land can be used for pasture, and where terraced and carefully handled can be successfully used for crop production. Cleared areas should be kept under sod as much as possible.

This land sells at prices ranging from $10 to $20 an acre, depending on location. The price of well-timbered areas is governed by the value of the timber.

RUSTON FINE SANDY LOAM

In forested areas the surface layer of Ruston fine sandy loam to a depth of 2 or 3 inches consists of gray or yellowish-gray mealy fine sandy loam which is darkened by organic matter to a depth of one-half inch. This layer is underlain by yellowish-brown fine sandy loam having a mealy consistence and single-grained structure which extends to a depth of 6 or 8 inches before grading into the reddish-brown or reddish-yellow firm friable light fine sandy clay subsoil containing a few rounded quartz gravel. At a depth ranging from

20 to 24 inches the subsoil becomes brownish-red light sandy clay streaked faintly with yellow and of the same general structure as the upper part of the subsoil. At a depth ranging from 36 to 40 inches lies the substratum of yellowish-brown gritty friable imperfectly weathered light sandy clay or heavy sandy loam, which in most places contains a noticeable amount of gravel. In nearly all places faint mottles of yellow are present. Many small patches of loam and fine sandy loam are included.

Areas of this soil are gently undulating, rolling, or strongly rolling but fairly smooth, and drainage is good throughout. The land has a tendency to gully badly if erosion reaches the softer parent material. This soil occurs mainly in small scattered areas in the south-central and southwestern parts of the county.

Ruston fine sandy loam is not extensive in Hardin County and therefore is not one of the important agricultural soils. About half of it is covered with forest of shortleaf pine and hardwoods such as red oak and hickory. The cleared areas are cropped mainly to cotton, though a small acreage is in corn, cowpeas, and oats. Crop yields are usually light, as little attention is given to farming this soil. Cotton yields about one-half bale to the acre, and both cowpeas and oats return only fair yields. Cotton yields depend mainly on the amount of fertilizer used. From 200 to 300 pounds of a 2–10–2 mixture to the acre is the most common application.

Land of this kind sells at this time (1926) at prices ranging from about $15 to $25 an acre, depending on location. Areas with little timber growth sell for $10 an acre.

Ruston fine sandy loam should be handled in much the same manner as Cuthbert very fine sandy loam. Larger amounts of fertilizer, not less than 400 or 500 pounds to the acre of a 2–10–4 mixture, should be used. This soil is fairly well suited to legumes such as Lespedeza, vetch, and cowpeas. It is also suitable for peach production and can be utilized for this crop on a commercial scale where transportation facilities are within reach. Terraces should be constructed where the surface soil shows signs of eroding.

Ruston fine sandy loam, rolling phase.—The rolling phase of Ruston fine sandy loam differs from the typical soil mainly in that it has a broken or hilly surface and is much less suited to farming. Most of these rolling areas are covered with forest similar to that on the typical soil, but a few areas are under cultivation. A number of fields that have suffered severely from erosion are abandoned.

Where farmed this land should either be terraced or kept under sod. Where badly eroded steps should be taken to reforest it. As it is naturally a pine soil, pines would probably succeed better than any other trees.

RUSTON GRAVELLY FINE SANDY LOAM

In forested areas the 2 or 3 inch surface layer of Ruston gravelly fine sandy loam consists of gray gravelly fine sandy loam slightly darkened near the top by organic matter. This grades into yellowish-gray gravelly fine sandy loam giving way at a depth of 6 or 7 inches to the reddish-yellow or yellowish-red friable granular slightly compact gravelly fine sandy clay subsoil. Below a depth of about 24 inches there is reddish-brown tightly cemented very light

gritty sandy gravelly clay continuing to a depth of 36 inches before it becomes mottled with yellow and gray. Below this depth the soil material is imperfectly weathered. The parent material, from 10 to 20 feet below the surface, consists of a bed of stratified and assorted gravel which though compact in place breaks up very readily. The gravel are rounded or waterworn quartz and quartzite with some chert and range in size from coarse sand to 1 or 2 inches in diameter. A few are larger. In places the gravel is cemented with iron, forming a conglomerate.

This soil occurs in narrow strips well distributed over the county on slopes around the edge of the terrace where erosion has cut down into the coastal-plain formation, around the base of hills, and on the tops of some ridges and hills. Areas are rolling, sloping, or strongly sloping but fairly smooth, and drainage is well or almost excessively established.

Ruston gravelly fine sandy loam is little used for farming. Most of it supports a growth of hardwoods, including post oak, red oak, hickory, and elm. Cotton is about the only crop grown, and the yields are usually poor. Most of the soil should be used as pasture or left in forest. Although erosion is not so active as on some other soils, crop yields are low and little can be done to improve the soil.

Ruston gravelly fine sandy loam, broken phase.—Ruston gravelly fine sandy loam, broken phase, includes all the Ruston gravelly fine sandy loam that is steep and cut by ravines and is therefore entirely unsuited to agriculture. It should be left in forest.

LUVERNE VERY FINE SANDY LOAM

In forested areas the surface soil of Luverne very fine sandy loam is covered by a ½-inch layer of dark leaf mold and soil. This rests on yellowish-gray floury very fine sandy loam, slightly darkened by organic matter, which grades at a depth of 3 or 4 inches into brownish-gray finely granular mellow very fine sandy loam continuous to a depth of 6 or 8 inches, where it gives way to deep-red firm friable slightly compact finely granular fine sandy clay. At a depth of 18 or 20 inches the subsoil becomes very compact and consists of brittle sandy clay containing some yellow mottles and having an irregular angular or blocky breakage and fine granular structure. Below a depth ranging from 36 to 40 inches is the partly weathered parent material, consisting of red, slightly mottled with yellow, compact very friable light sandy clay having an angular breakage. Some areas having a fine sandy loam texture are included with mapped areas of this soil. In a number of areas a gravel substratum lies below a depth ranging from 4 to 6 feet, but in most areas the substratum is composed of sandy clay or medium-grained sand.

Areas of this soil range from gently rolling to hilly, and drainage is thorough. The high state of oxidation indicates that aeration is good. The soil is acid throughout. Small scattered areas are mapped principally in the western part of the county. The largest area is in the Hookers Bend region.

Although inextensive this is a fairly important soil, and about 60 per cent of it is cleared and utilized for farming. The remainder is covered by a second growth of pine and hardwoods such as post oak, red oak, white oak, hickory, elm, and cedar. Cotton is the

leading crop. Some oats, soybeans, and corn are grown, and also small patches of sweetpotatoes and other vegetables. Where properly fertilized cotton yields from three-fourths to 1 bale to the acre in good seasons, but it averages only about one-half bale to the acre. Oats yield from about 25 to 30 bushels to the acre and corn from 20 to 40 bushels, with an average of about 25 bushels.

Agricultural practices on this soil do not differ markedly from those employed on the other upland or coastal-plain soils. Little manure is used, few cover crops are grown, and little organic matter is incorporated with the soil. From 200 to 300 pounds of a 2–10–2 grade of fertilizer is used on cotton. Many fields have suffered from erosion.

The selling price for good average farm land ranges from $40 to $75 an acre. Badly eroded land is much cheaper. The price of land in forest depends largely on the timber.

This soil is very well suited to the production of cotton and this crop could be more extensively grown. The application of larger amounts of fertilizer on cotton would be found profitable. From about 500 to 600 pounds to the acre would not be too much if the crop were properly cared for. Eroded areas of this soil should be terraced or put into sod. Lespedeza or Bermuda grass is probably the best crop for such areas. Where properly handled a variety of both feed and subsistence crops can be successfully grown. Where the soil is manured and cover crops are turned under it yields well.

GUIN FINE SANDY LOAM

Areas of Guin fine sandy loam include undifferentiated Ruston, Cuthbert, and Luverne soils, and remnants of old river-terrace soils, mainly of fine sandy loam texture. Some very fine sandy loam and some gravelly and stony areas are also included.

Soil of this kind occurs in extensive areas in the eastern half of the county on hills and ridges, in many places occupying the whole hill and in other places only the broken sides of hills that are capped with Cuthbert or Pheba soils or have Baxter or other limestone soils along the base.

The agricultural value of Guin fine sandy loam is very low. Most of the land is covered with forest of pine and mixed hardwoods. A few areas are under cultivation to cotton, corn, and cowpeas, all of which return scant yields. The cleared areas have suffered severely from erosion.

The selling price of this land depends chiefly on the value of the timber. Where cut over or covered by a sparse timber growth, prices range from $5 to $8 an acre. Cleared land rarely brings more than $10 an acre even under the best conditions.

Most of this land should remain in timber, though some of the more gently sloping areas could be utilized for pasture by seeding to Lespedeza or Bermuda grass. Little attempt should be made at cultivation.

GUIN GRAVELLY SANDY LOAM

The characteristics of Guin gravelly sandy loam are essentially the same as those of Ruston fine sandy loam. Areas of Luverne very fine sandy loam have been included in mapping. The surface

soil consists of sandy loam which contains gravel in proportions ranging from 20 to 60 per cent of the soil mass. The subsoil in most places is a mass of gravel containing little soil material, and the substratum consists of gravel weakly cemented with ferruginous material. The gravel consists of small rounded quartz fragments.

Most areas of this soil are broken or hilly and some occupy narrow serrated hog-backed ridges. Drainage is inclined to be excessive. Four fairly large areas are mapped in the northern part of the county on the ridge between Swift and Mountain View School, in the south-central part from Pyburns to Sand Mountain and north along the ridge toward Savannah; west of Tennessee River in the vicinity of Holtsville; and in scattered areas south and southeast of Counce. Stony areas occur, mainly on the caps of ridges or knolls, scattered over areas of Guin soils. The stones, which are scattered on the surface and embedded in the soil, consist of large pieces of conglomerate and ferruginous sandstone.

Most of this land is in forest similar to that on Guin fine sandy loam. It has a very low agricultural value and should be left in forest. The underlying gravel beds are valuable for road surfacing, railroad ballast, and use in concrete construction.

SUSQUEHANNA VERY FINE SANDY LOAM

In the forested areas of Susquehanna very fine sandy loam a thin veneer of organic matter covers the surface. The surface layer is yellowish-brown mealy very fine sandy loam 3 or 4 inches thick. This grades into brownish-yellow or yellow mellow or floury very fine sandy loam which is underlain at a depth of 6 or 7 inches by the yellowish-red or brownish-red, faintly mottled with yellow and gray, clay upper subsoil layer which is tough and plastic when moist but dries out to a fine fragmental structure. This layer continues to a depth ranging from 12 to 15 inches, where it grades into the lower subsoil layer which is of the same consistence, structure, and texture but of more intensely mottled color. Between depths ranging from 20 to 24 inches and 4 to 6 feet is imperfectly weathered material of much the same character as the mottled gray and red subsoil. This is underlain by the partly decomposed soft gray imperfectly formed shale from which the soil has weathered. In cultivated fields the surface soil is grayish brown and ranges from 6 to 8 inches in thickness. Some small areas of Susquehanna clay loam in which the surface layer of fine material is only from 1 to 3 inches in thickness are included. The largest body of the clay loam is on the ridge between Alexander Creek Canal and Flats Creek Canal.

Susquehanna very fine sandy loam occurs in the northwestern part of the county in comparatively small areas east of Lebanon and in the vicinity of Sibley. The areas range from gently rolling to hilly. Surface drainage is good, but internal drainage is imperfectly established. The subsoil is very retentive of moisture. This soil is strongly acid throughout.

Although inextensive and therefore not agriculturally important, much of the Susquehanna very fine sandy loam is under cultivation. Forest of hardwood in which red oak predominates occupies about

30 or 40 per cent of the land. Cotton is the leading crop, but some oats, wheat, and small patches of both feed and subsistence crops commonly seen around homesteads are grown. Owing to the proximity of extensive bottom lands, which are suited better to this crop, little corn is grown. Crop yields are only fair. Cotton produces from one-third to one-half bale to the acre. From 150 to 200 pounds to the acre of a 2–10–2 fertilizer is usually applied to cotton, and the small available quantity of manure is used mainly on this crop.

The selling price of this land ranges from $10 to $25 an acre.

This soil, like most of the coastal-plain soils, is deficient in organic matter, and some method should be used to increase the supply. The soil is well suited to Lespedeza and Bermuda grass and more of these grasses should be seeded, especially where the soil is beginning to wash. Cotton would succeed better if about 400 pounds of fertilizer to the acre were applied. This land is well suited to berries and could be used in their production if transportation facilities were better. Oats succeed fairly well, and such legumes as cowpeas, soybeans, and vetch do well enough to be more extensively grown as hay and as soil builders. Peanuts and sweetpotatoes do fairly well.

OKTIBBEHA SILTY CLAY LOAM

The surface layer of Oktibbeha silty clay loam in forested areas consists of a one-fourth or one-half inch layer of soil mixed with leaves and roots or darkened by organic matter overlying yellowish, grayish, or grayish-yellow mellow and floury silt loam or light silty clay loam which grades within 2 inches into orange-yellow or yellowish-brown mellow silty clay loam. At a depth ranging from 4 to 6 inches this material passes into the upper subsoil layer of reddish-brown tough clay which is sticky when wet but when dry breaks into small blocky fragments which may be termed coarsely granular in structure. This layer grades almost imperceptibly at a depth ranging from 12 to 15 inches into a second subsoil layer of yellowish brown or slightly olive-yellow sticky clay, which has an irregular angular breakage or coarse granular structure. This layer grades from yellowish brown to brownish yellow with depth, passing at a depth ranging from about 20 to 24 inches into olive-gray, streaked with rust yellow, slightly sticky firm but not very compact tough clay or silty clay which has a somewhat blocky breakage and coarsely granular structure and contains a quantity of large yellow or yellowish-brown iron concretions. The substratum occurs at an average depth of 36 inches and consists of imperfectly weathered whitish-gray silty clay loam streaked with yellow. It has a blocky breakage and is finely granular in structure. At a depth ranging from 4 to 6 or more feet whitish and whitish-gray chalky lime and shell beds are present. The surface soil is strongly acid, the subsoil layers are medium acid, and the lower layers are strongly alkaline. The material in the lower layers effervesces with hydrochloric acid, indicating the presence of lime.

Areas of this soil are smooth or gently undulating, and drainage is good. The subsoil has good moisture-holding and moisture-storing capacity. The largest areas of the soil are in the vicinity of and northwest of Morris Chapel. Nearly all the land is covered with forest consisting mainly of post oak with scattered white oak, red

oak, hickory, elm, and maple. The small cleared areas are cultivated to cotton, corn, oats, and soybeans, all of which yield fairly well especially on the lower slopes where the surface soil is shallower and the parent lime material lies nearer the surface. Cotton yields from one-half to three-fourths bale to the acre with light fertilization.

Owing to its location near good highways, this soil sells for a higher price than its agricultural value would warrant. It commands from $20 to $50 an acre.

This soil is good potential cotton land. Experiments by the Mississippi Agricultural Experiment Station[2] on this soil show that fair results were obtained from cotton by the use of 500 pounds to the acre of a 4–8–4 fertilizer and that the best results were made with 1,000 pounds of a 4–8–4 mixture. Where the marl underlying this soil is applied to the surface and cover crops are turned under good yields of most crops grown in this section may be obtained. Corn, oats, wheat, and legumes such as white clover, red clover, cowpeas, soybeans, and Lespedeza can be successfully grown.

Oktibbeha silty clay loam, greensand phase.—In forested areas a thin film darkened by organic matter covers the surface of the greensand phase of Oktibbeha silty clay loam. The surface soil consists of yellowish-gray floury silt loam or very fine sandy loam about 2 or 3 inches thick, which grades into brownish-yellow mellow floury silt loam or silty clay loam continuing to a depth of 5 or 6 inches before grading into coarsely granular red, reddish-yellow, or reddish-brown silty clay loam or clay slightly mottled with yellow and having an angular or blocky breakage. At a depth of about 20 inches this layer is underlain by brownish-red very fine sandy clay highly mottled with olive green, yellow, and gray. This material is of coarsely granular structure and small irregular angular breakage. It extends to a depth ranging from 36 to 40 inches before passing into imperfectly weathered greenish very fine sandy clay mottled with yellow, yellowish-brown, and gray. The breakage is irregular and angular and the structure coarsely granular. At a depth of about 4 feet the unweathered parent material of olive-green greensand is reached. The soil is acid throughout. In cleared fields the surface soil is yellowish-gray silt loam 7 or 8 inches thick. In adjoining counties to the north this phase of the Oktibbeha soil is mapped as Safford silt loam.

The total thickness of this soil differs considerably from typical on the slopes. Where the parent material lies within 2 feet of the surface, the surface soil is much shallower, the color of the upper subsoil layer is more pronounced red, fewer mottles are evident in the lower subsoil layer, and each layer is decidedly thinner, except the upper subsoil layer which is slightly thicker.

Areas of this phase of soil are gently undulating or smoothly rolling, and drainage is well established. Erosion is active along the edges of areas, and in many places the parent material is exposed. The soil occurs in the northwestern part of the county, chiefly between Middleton and Hurricane Creek Canals. The total area is not large, but the soil is fairly important in the region where it occurs. About 50 per cent is cleared, and the remainder is covered

[2] O'KELLY, J. F., and HULL, W. W., COTTON EXPERIMENTS, 1925. FERTILIZERS AND VARIETIES. Miss. Agr. Expt. Sta. Bul. 230, 14 p., illus. 1925.

with post oak, red oak, and hickory trees. The cleared areas are used for cotton, wheat, oats, and cowpeas, together with the accompanying small patches of subsistence crops common around homesteads. Cotton is the leading crop, and little corn is grown, as large areas of bottom land are in the vicinity. Cotton yields from one-fourth to three-fourths bale to the acre where fertilized with from 100 to 200 pounds of commercial fertilizer to the acre. Wheat yields from 8 to 18 bushels to the acre and oats from about 15 to 30 bushels. Cowpeas and soybeans make fair yields. A fairly large acreage on the slopes or side hills is in pasture of Lespedeza or Bermuda grass, both of which form a good sod.

This land is located in a well-settled region on the ridges between large bottom-land areas and for this reason is desirable for homesteads. Selling prices range from $20 to $50 and more an acre, depending on improvements.

Most areas of the greensand phase of Oktibbeha silty clay loam are deficient in organic matter. This should be added by turning under cover crops. The soil is well suited to the production of cotton, which is the best cash crop that can be grown. Larger amounts of fertilizer should be used. The greensand deposits under the soil contain a small amount of potash and would improve crop yields if applied to the surface. The soil is well suited to cowpeas and Lespedeza, and these legumes should be more extensively grown. Other suitable crops are peanuts and sweetpotatoes.

Oktibbeha silty clay loam, broken phase.—The broken phase of Oktibbeha silty clay loam occurs on steep hillsides where much of the surface soil of the typical soil has been removed and the greenish-yellow or olive-gray subsoil exposed. Soil of this phase is badly gullied and is otherwise unfit for farming. Where cleared it could be put in clovers, especially white clover, and used for grazing. This soil is mapped in a comparatively narrow strip along the south escarpment of Mud Creek Valley. Drainage is excellent. Practically all the land is in forest, supporting in general the same tree growth as the typical soil, with less post oak and more white oak, red oak, hickory, and other hardwoods. Although occupying steep hillsides, the soil is retentive of moisture.

PHEBA SILT LOAM

In forested areas the surface soil of Pheba silt loam is dark-gray mellow very fine sandy loam containing some organic matter in the first half inch and grading at a depth of 1 or 1½ inches into light yellowish-gray mellow or friable silt loam which contains very little organic matter. At a depth ranging from 4 to 6 inches it is underlain by brownish-yellow or buff firm but friable silty clay loam which breaks along irregular lines. This layer extends to a depth ranging from 15 to 20 inches before becoming slightly compact. The compact layer is yellowish-brown silty clay loam mottled with reddish brown and gray. It is underlain at a depth of 36 inches by very compact gritty fine sandy clay loam mottled red, reddish brown, and gray and having an irregular blocky breakage. This grades at a depth of 60 inches into mixed gray and yellow tough sandy clay. Most of the gray splotches are clay, and the remainder of the mass is fine sandy clay. The substratum, at a depth ranging from 7 to 12

or more feet, gives way to whitish-gray calcareous chalk of the Selma chalk formation. In the gradational layer between the second subsoil layer and the substratum, between depths of 30 and 36 inches, there are numerous large rust-colored iron concretions ranging from one-half inch to several inches in diameter. Some areas of Pheba very fine sandy loam are included in mapping.

Pheba silt loam occurs in comparatively small areas in the northwestern part of the county where it is closely associated with soils derived from Selma chalk. It occupies fairly level or gently undulating upland areas. Surface drainage is fairly good, but the substratum retards the downward movement of drainage water to a marked extent.

Pheba silt loam is a postmature soil of the Selma chalk formation. It is not extensive and therefore not agriculturally important. Only a very small area is cleared and used for cultivated crops. The forest growth consists mainly of post oak, with a few white oak, red oak, and hickory. Cotton, the principal crop, yields from one-half to three-fourths bale to the acre.

This soil should be handled in much the same manner as the smoother Savannah soils. It has a higher moisture-holding capacity and according to farmers is more retentive of fertilizers and improvements than the Savannah terraces.

HAGERSTOWN SILT LOAM

Forested areas of Hagerstown silt loam have a 2 or 3 inch surface layer of dark grayish-brown or yellowish-gray mellow loam grading into finely granular yellowish-brown silt loam which passes at a depth of 7 or 8 inches into reddish-brown slightly tight but friable very fine sandy clay or silty clay having an angular breakage and coarse granular structure. Below a depth of 20 inches the material becomes slightly redder, is streaked with yellow, and is slightly heavier. This condition continues to a depth ranging from 36 to 40 inches, at which depth lies the reddish-brown crumbly friable very fine sandy clay mottled or streaked with yellow and gray imperfectly weathered parent material which is less tight and less compact than the lower subsoil layer and has a blocky or angular breakage. In cleared fields the surface soil is yellowish-brown silt loam about 7 or 8 inches thick.

Hagerstown silt loam is formed from the weathering in place of more or less highly carbonaceous limestones. Weathering has taken place to a depth ranging from 4 to 5 feet on the average, but in many places the soil covering is comparatively shallow, the limestone rock lying in ledges near the surface. In fairly extensive areas considerable gravel is present on the surface and in places throughout the soil, but in general most of the gravel occurs within a depth of 1 foot from the surface. It consists of both limestone and chert fragments, the last-named being a residue from the overlying chert formation. These included areas occur mainly in the northeast part of the county between Olivehill and Tennessee River. In other areas a quantity of stone, ranging in size from small fragments to large bowlders of comparatively pure limestone, lies on the surface and is embedded in the soil. The stony areas are not extensive, the largest ones occurring in the "glade section," between Indian and Hardin Creeks

southeast of Mountain View School and between Hardin Creek and the northeast county line.

Small included areas are much redder and heavier textured throughout than typical. They occupy the low sloping hills around Turkey Creek in the vicinity of Old Town and elsewhere. These areas represent much younger soils than the rest of the Hagerstown silt loam and are also more highly oxidized. The surface soil of practically all this included soil has been removed by erosion and the subsoil exposed. For this reason the present surface layer has a more pronounced granular structure than the typical soil. These areas are better suited to small grains and grass than is the typical soil. Several small areas in the vicinity of Mount Carmel Church and Union Chapel in the east-central part of the county have grayish and yellowish-gray floury silt loam surface soils, which give way within a few inches to yellowish-brown silt loam continuous to a depth of 8 or 10 inches. The subsoil of reddish-brown friable silty clay loam extends to a depth ranging from 20 to 30 inches, at which depth it is underlain by red or reddish-brown gritty clay, mottled or streaked with yellow.

Areas of Hagerstown silt loam are well distributed over the northeastern and north-central parts of the county where this soil occurs as a well-defined bench between the stream bottoms and the high hills composed of Baxter soil. Areas range from gently undulating to sloping, and drainage is good. About 75 per cent of the land is cleared and used for farming. The forest consists almost entirely of hardwoods, such as white oak, red oak, walnut, hickory, dogwood, beech, and cedar. Pine predominates in the second growth, but very little is present in the virgin forests.

The principal crops are cotton, clover, corn, wheat, and oats. Cotton probably occupies a larger acreage than any other crop. Clover is important, and several small patches of alfalfa were noticed. A fairly large acreage is in pasture. Crop yields are fairly good. Cotton yields from three-fourths to 1 bale to the acre, corn from 25 to 40 bushels, oats from 20 to 30 bushels, wheat from 10 to 15 bushels, and clover about 1 ton of hay. The pasture is only fairly good, as there is little bluegrass.

Little or no fertilizer is used except on cotton, and on that crop less than 300 pounds to the acre is applied. The small amount of manure available is used on cotton, small patches of other field crops, and garden crops. Little sod land is turned, and liming is not practiced. Aside from the clover and grain stubble turned under the land receives little organic matter.

Owing to its location and productiveness, Hagerstown silt loam is held at a higher price than most of the upland soils in the county. It commands from $20 to $75 an acre, and some areas sell for $100.

This soil is deficient in organic matter which can be added by turning under sod or cover crops. Areas in which erosion has gained a foothold should be put under sod and kept in pasture. If green-manure crops are turned under and liming is practiced, this land will not need much other fertilizer. It is naturally productive and with good management will produce profitable returns of nearly all crops common to this section of the country. It is suited to cotton, clover, alfalfa, corn, wheat, and grasses. In Kentucky it is used for growing Burley tobacco. It is also suited to stock raising.

The gravelly areas are especially well suited to cotton and fruit growing. Were they located where transportation facilities are better they could be utilized for fruit growing on a commercial scale. The very stony areas should be left in pasture.

FAIRMOUNT SILTY CLAY LOAM

The surface soil of Fairmount silty clay loam in forested areas consists of a layer, ranging from 2 to 4 inches in thickness, of dark grayish-yellow mellow granular loam or very fine sandy loam of high silt content, which is covered by a thin veneer of leaves mixed with dark soil. In most places this layer is rather abruptly underlain by olive-yellow very plastic impervious clay having a blocky breakage. It is massive in structure and extends to a depth of 10 or 12 inches before passing into yellow gritty very tough plastic clay containing calcareous nodules and small pieces of limestone. Below a depth ranging from 24 to 30 inches, the partly weathered parent material, which consists of greenish-yellow tough moderately plastic clay mottled with gray and brown and containing lime nodules and pieces of limestone, is reached. Partly weathered greenish clay mixed with limestone rock occurs 4 or 5 feet below the surface. Fairmount silty clay loam may be considered a very young soil, as weathering of the parent limestone rock has taken place to a comparatively slight depth. In the northeastern part of the county, the yellow color of the soil is more pronounced and weathering is slightly deeper. There are strong indications that the soil in this location consists of the subsoil only, the original surface soil and part of the subsoil having been removed by erosion. Only a shallow new surface soil has formed under the second-growth forest. The subsoil is not so thoroughly weathered as that in typical areas of this soil.

To a depth ranging from 2 to 4 inches, the soil gives a neutral or mildly alkaline reaction. The upper part of the subsoil gives an alkaline reaction, and the lower part is strongly alkaline. The material of the substratum effervesces strongly with hydrochloric acid, showing the presence of lime.

Many areas in which considerable gravel occurs on the surface and throughout the entire soil are included with Fairmount silty clay loam in mapping. The gravel consists of small angular and subangular pieces of limestone rock. In other places much limestone rock occurs on the surface and embedded in the soil and numerous limestone ledges protrude. These gravelly areas are well distributed over the county, the larger ones occurring in the northeastern part southeast of Purity.

This soil occurs only in comparatively narrow strips along the base of hills and in low saddles throughout the north-central and northeastern parts of the county. Areas are gently undulating, sloping, or strongly sloping in places, but in general the surface relief is rather subdued. Surface drainage is good, but internal drainage is retarded to some extent by the heavy texture of the soil. Both surface soil and subsoil are highly retentive of moisture.

Fairmount silty clay loam, as far as was observed, is not used for farming. Some areas show the evidence of having been cleared and cultivated at one time. These cleared spots have suffered severely from erosion, the entire surface soil being removed in places, expos-

ing the greenish-yellow clay subsoil. Some pastures which have grown up in brush and cedars furnish only fair grazing. The forest consists almost entirely of white oak, red oak, black oak, hickory, cedar, and elm. The price of this land is from $8 to $10 an acre, except for areas covered with valuable hardwood timber, which command a higher price.

This land can be utilized in the production of small grains and grasses and for pasture. It is a difficult soil to cultivate and would require heavy draft for plowing. Owing to its shallowness it would be difficult to bring the soil into good tilth for seeding. Sweetclover and other legumes should succeed.

HARDIN FINE SANDY LOAM

The surface soil of Hardin fine sandy loam to a depth ranging from 12 to 20 inches is coastal-plain material similar to that of the Ruston soils. It overlies limestone material ranging from Fairmount to Decatur material which in many places is badly mixed within short distances. The two profile descriptions that follow are representative of most of this classification: (1) The surface layer, to a depth ranging from 3 to 5 inches, is dark grayish-brown or dark grayish-yellow single-grained or mealy fine sandy loam or very fine sandy loam. It is underlain by light grayish-brown or grayish-yellow mellow fine sandy loam, which extends to a depth of 10 or 12 inches before grading into yellowish-red or brownish-red friable fine sandy clay having an irregular breakage and finely granular structure. At an average depth of about 20 inches the material changes rather abruptly, the soil passing into material of limestone origin consisting of greenish-yellow or olive-yellow plastic clay, containing a few red mottles, which is coarsely granular in structure and alkaline in reaction. Below a depth ranging from 30 to 36 inches the material is greenish-yellow gritty plastic coarsely granular clay mottled with gray and brown and containing some limerock. This material breaks into blocks. (2) Grayish-brown or yellowish-brown fine sandy loam passing at a depth of 3 or 4 inches into yellow or yellowish-brown heavy fine sandy loam which, at a depth ranging from about 8 to 12 inches, in underlain by light-red finely granular fine sandy friable clay. At a depth ranging from 20 to 24 inches this material gives way to a red or brownish-red coarsely granular clay of limestone origin and having a blocky breakage. At a depth ranging from 30 to 36 inches the material is somewhat compact tough, though brittle when broken, brownish-red clay containing some yellow and gray mottles and having an acid reaction. In places the surface soil to a depth of 5 or 6 inches is very fine sandy loam.

This soil represents the transition from the overlying coastal-plain deposits to the limestone. It occurs in comparatively narrow strips, mainly around the base of the hills, and is most prominently developed in the central part of the county along Horse and Turkey Creeks and their tributaries. The areas are gently undulating or sloping. Surface drainage is good, but internal drainage is so retarded that seeped spots are common.

Although this is not a very important soil, nearly half of it is cleared and under cultivation. The forest includes pine and hardwoods. The pines and cedars are largely second growth. The hard-

woods are white oak, red oak, black oak, some elm, and hickory. The principal crops grown are small grains (wheat and oats), corn, cotton, clover, and soybeans. Some of the land is in pasture. Corn yields are not high, as little attention is given to farming this land. Small amounts of fertilizer are used, mainly on cotton. Cotton yields average about one-half bale to the acre, and yields of other crops are comparatively low.

Land of this kind sells at prices ranging from $10 to $20 an acre, depending on location and improvements.

This soil can be used with fair success in the production of practically all crops grown in this section of the country.

BAXTER GRAVELLY LOAM

In forested areas the surface layer of Baxter gravelly loam is dark grayish-yellow floury very fine sandy clay or dark yellowish-brown floury silt loam to a depth of 2 or 3 inches. A half-inch layer of dark forest débris mingled with soil material and roots and containing some chert gravel covers the surface. The subsurface layer is yellow, buff, or grayish-yellow decidedly floury very fine sandy loam or silt loam which extends to a depth ranging from 7 to 12 inches, where it grades into red or reddish-brown brittle though moderately friable very fine sandy loam or clay having a decidedly blocky breakage and containing some chert gravel and fragments. This layer continues to a depth ranging from 18 to 24 inches before passing into reddish-brown or red, mottled or streaked with yellow and gray, firm but not intensely compact clay containing a quantity of chert fragments. This layer, which is the lower subsoil layer, ranges from 6 to 10 inches in thickness and grades below into the gray very fine sandy clay or clay imperfectly weathered parent material, which is mottled or mixed red, yellow, brown, and gray. This material is somewhat compact but friable, has a decidedly blocky breakage, and contains a quantity of chert gravel. The weathered parent material of whitish-gray chert lies at a depth ranging from 2 to 6 feet below the surface. In cleared fields the surface soil is yellowish-brown loam from 7 to 10 inches in thickness. In places where erosion has been active it is reddish brown and slightly shallower. In a number of places in the vicinity of Jones Store and scattered over the southeastern part of the county the whitish-gray cherty parent material is closer to the surface, and in other spots in this region the blocky chert gravel composes most of the soil material.

Most areas of this soil are sloping or steeply sloping. The soil occurs on hillsides, in places extending over the ridges but rarely extending from top to bottom. Many of the hills are capped with coastal-plain material and in other places the base of the hill is derived from limestone. Drainage is inclined to be excessive. In a number of areas, occurring mostly on narrow ridge tops and the steeper hills, the soil carries a high proportion of chert bowlders. The stone-capped ridges are prominent in the region around Olivehill, on the ridges between Hardin and Indian Creeks, and on the steeper hillsides in the vicinity of Walnut Grove. These areas are largely unfit for agriculture.

Baxter gravelly loam is widely distributed over the county, occurring mainly in the eastern half where the most prominent development is on the ridges between Indian Creek and Hardin Creek and between Hardin Creek and the county line. This is one of the most extensive soils in the county but is little used for farming. Fully 90 per cent is covered with a substantial forest growth consisting of hardwoods, white oak, red oak, beech, hickory, walnut, and elm. The small cleared area is used for pasture, for the production of cotton, and to a small extent for corn and small grains. Crop yields are generally low, except in places where the low benches have been used for cotton and fair amounts of fertilizer and some manure have been used. In such places from three-fourths to 1 bale of cotton to the acre have been reported but the average for the soil as a whole does not exceed one-half bale. Small grains do well, but in general the land is too steep for the profitable production of grain crops. The pasturage is fair, as Lespedeza grows without seeding.

Little effort is made toward improving or farming this land. Cut-over land sells at prices ranging from $5 to $8 an acre and farm land from $10 to $15. The price of well-timbered land is governed by the commercial value of the timber.

As much of the Baxter gravelly loam is not well suited to agriculture it should remain in forest. Cleared areas can be utilized as pasture land. In adjoining counties this soil is successfully farmed to a variety of crops, but most of the cleared land is in pasture. In the north-central counties of Tennessee tobacco is grown on this kind of soil. It is a good fruit soil, and where transportation facilities are available commercial apple growing would be profitable. Tobacco and cotton would probably be the most profitable crops. The best utilization for most of this soil is stock raising. The gravel acts as a mulch, helps hold moisture, and protects the land from erosion. Even the steep areas will not erode so easily as less steep areas unprotected by gravel.

CUMBERLAND SILT LOAM

In forested areas the surface layer of Cumberland silt loam to a depth of a few inches consists of dark yellowish-brown mellow silt loam mixed with organic matter. This is underlain by a shallow layer of light yellowish-brown material which in turn passes into reddish-brown or reddish-yellow mellow and floury silt loam continuous to a depth of 10 or 12 inches. This layer grades into dull-red compact but friable granular clay loam or clay which below a depth of 36 inches gives way to bright-red compact clay showing a more or less platy cleavage. This material becomes slightly lighter, more gritty, and less compact below a depth of 40 inches, grading into gravel at a depth of 4 feet. The gravel consists largely of chert more or less waterworn and tightly cemented with iron. Cumberland silt loam as mapped in Hardin County is not so brown in the surface soil nor so red in the subsoil as typically developed Cumberland soils.

In cleared areas the surface soil is mellow floury brown silt loam, ranging from 8 to 10 inches in thickness. In fields long under cultivation a decidedly heavy or compact stratum showing a platy structure at a depth of 8 or 10 inches seems to be the result of the action of the moldboard on the upper part of the clay soil when wet.

The more level areas of this soil have a decided tendency to develop a yellow, yellowish-brown, or reddish-yellow color throughout, and noticeable numbers of small round black iron concretions that produce dark spots or specks on disintegration are scattered through the soil. Yellow mottles occur in places below a depth of 40 inches. The soil contains very little organic matter. Acidity tests show a slightly acid reaction in all layers.

Cumberland silt loam occurs as fairly level or gently undulating terraces that stand from 40 to 100 feet above stream level. Drainage is well established, and aeration is good. The most extensive developments are on the stream edges of the terraces along the larger streams and near the entrance of the larger streams into Tennessee River. On some slopes and gently rolling areas where no care has been taken to protect the surface soil from washing the land is badly eroded or gullied. In other places the loose surface soil has been removed by the action of sheet erosion. The areas most affected by sheet erosion are the terraces south of Saltillo. These badly eroded areas have a very low agricultural value. They are used mainly for pasture land. Terracing, sodding to Lespedeza or Bermuda grass, or planting to locust are the best methods for checking erosion.

This is a fairly important soil, at least 75 per cent of it being cleared and used for farming purposes. The forest growth includes white oak, red oak, post oak, hickory, and a few other hardwoods. The cleared areas are cultivated to cotton, corn, wheat, oats, clover, cowpeas, and soybeans, with small patches of vegetables, sorghum, and hay. Comparatively small areas are in pasture. Crop yields are fairly good, as more attention is given to farming this land than most of the upland soils. Cotton yields from three-fourths to 1 bale to the acre, corn from 30 to 50 bushels, wheat from 10 to 12 bushels, oats from 20 to 25 bushels, and clover about 1 ton of hay.

Although clean cultivation is practiced and little organic matter is incorporated, some manure and probably more fertilizer are used than on any other soil in the county. From 400 to 800 pounds of commercial fertilizer to the acre are used on cotton and smaller amounts on corn. Some superphosphate and small amounts of nitrate of soda, as a top-dressing, are used on grain.

Cumberland silt loam sells at prices ranging from $50 to $100 an acre.

Land of this kind is deficient in organic matter, and cover crops should be turned under every four or five years. More legumes should be grown, preferably clover and soybeans and some alfalfa. Lime should be applied at a rate ranging from at least 500 to 800 pounds to the acre when sod or cover crops are turned. Where such a farming system is followed and the available manure is used, the amount of fertilizer may be reduced several hundred pounds an acre and crop yields will increase. The land is well suited to the production of cotton and fairly well suited to small grains, but these should be grown only in rotations. Although not so well suited to corn or grass as the bottom lands, this soil can be built up so that it will produce good yields of these crops. This soil holds improvements better than the lighter upland soils.

SAVANNAH SILT LOAM

In forested areas Savannah silt loam is covered by a very thin layer of mold which is underlain by light-brown or light yellowish-gray floury silt loam mixed to a depth of a few inches with organic matter which gives the material a dark-gray color. At a depth of 5 or 6 inches this layer grades into yellowish-brown or buff-colored heavy silt loam which is firm but friable when dry but which has a tendency to stick to the soil auger when moist. At a depth ranging from 15 to 20 inches the material becomes pale-yellow or yellow somewhat compact but friable silty clay loam through which are distributed small faint mottles of gray becoming more intense with depth. These gray mottles are more pronounced on the more level areas. At a depth ranging from 24 to 30 inches is a compact layer of fairly heavy clay loam or clay which breaks into irregular blocky fragments. It is mottled yellowish brown, yellow, and gray, with some red. The brown and gray spots are small, most of them less than one-half inch in diameter. The brown spots are inclined to be lumpy, breaking down easily into fine sandy clay particles. The gray spots are clayey. Below a depth of 36 inches fairly heavy clay is present. This material contains numerous mottles of red and buff and a few of gray, yellow, and brown. The red mottles predominate at the greater depths. This layer is less compact and more friable than the layers above. It contains some gritty material and is more or less platy in structure. Especially on the more level areas and the older terraces it contains gray strata or streaks of clay lying in horizontal, vertical, and transverse lines. These gray clay plates are thicker on the older terraces. At a depth ranging from 4 to 6 or more feet is partly disintegrated gravel and gritty clay which within a few inches gives way to chert gravel tightly cemented with reddish ferruginous material. To a depth ranging from 24 to 30 inches the faces of transverse breaks show little difference in color from freshly cut surfaces, but below this depth the broken faces are darker than fresh cuts.

In cleared areas or cultivated fields the surface soil is yellowish-brown very fine sandy loam or light silt loam. The silt loam is more noticeable on the smoother areas. It is from 6 to 10 inches in thickness and is inclined to be floury in consistence. All layers of this soil which were tested proved strongly acid. Little or no organic matter is present in the cultivated soil and only small amounts in forested areas.

Some gravelly areas are included with Savannah silt loam in mapping. These consist of spots where the surface material has largely been removed by erosion, leaving the underlying gravel and some of the soil material exposed. They carry a large proportion of gravel, but in other respects are similar to typical areas. The gravel consists of rounded chert. It makes up from 10 to 60 per cent of the soil mass and in places almost the entire substratum is composed of it. This gravelly variation occurs in small scattered irregular-shaped spots around the edges of typical areas.

Areas of this soil occur on fairly smooth, gently sloping, or gently undulating terraces which lie from about 100 to 150 feet above the level of Tennessee River. Drainage is well established, although the

tight deep subsoil, or zone of concentration, causes a slight stoppage of water movement. The original deposits have suffered to considerable extent from erosion, the streams having cut back in numerous places exposing the gravel underneath. The largest areas are in the vicinity of Savannah, on the terraces on the west side of Tennessee River, and near Crump, Saltillo, Childers Hill, and Shiloh Church. Smaller areas are scattered in other parts of the county.

About 50 per cent of the Savannah silt loam is cleared, and the remainder is largely covered with post oak, a little underbrush, and a few scattered white oak and hickory trees. The cleared areas are used for farm buildings and the production of all the crops grown in the county. Cotton and small grains are the principal field crops. Some soybeans are grown. Crop yields are comparatively low except where the land is heavily fertilized. Corn yields from 25 to 40 bushels to the acre, wheat about 10 bushels, oats about 20 bushels, and cotton about one-half bale though rarely the yield is 1 bale. Commercial fertilizer is used, mainly on cotton, at a rate ranging from about 300 to 400 pounds to the acre. The small amount of manure available is used on gardens or small patches of special crops and on cotton. The prevailing cultural practices have resulted in the complete exhaustion of the originally small supply of organic matter, which is not being replenished by turning under green-manure crops. Plowing is usually shallow.

Owing to its location and desirability for residential purposes this land commands a price above its agricultural value. The price ranges from $20 to $150 an acre, depending on location and improvements. The timber is of value only for firewood.

Savannah silt loam is well suited to cotton, and this should be the leading crop. It is only fairly well suited to small grains, and these should be grown only in rotations. Potatoes and sweetpotatoes thrive, and in other counties of the State similar soil is used to advantage in the production of tobacco. It is also fairly well suited to truck crops, which could be grown if the marketing problem could be solved. Vegetables grown for market should be given an acreage application ranging from 500 to 1,000 pounds of 4–8–4 to 4–8–6 fertilizer. For the best results in farming, especially where legumes are to be grown, and no system of farming should be attempted on this land without such crops, liming should be practiced. About 1,000 pounds of burnt lime to the acre should be applied every four or five years or when the rotation is changed. Organic matter should be added by turning under green crops or the stubble of legumes and small grains.

Savannah silt loam, high phase.—The surface soil of the high phase of Savannah silt loam is slightly deeper and grayer than in typical Savannah silt loam. The gray mottles in the lower part of the subsoil are more pronounced, and the flaky breakage of the deeper subsoil layers has developed stronger lines of cleavage. The substratum is more completely dissected by clay planes, which divide the material into blocks from 2 to 3 inches in diameter and from one-fourth to one-half inch in thickness. The substratum contains no iron concretions and little gravel. The gravel present is mainly quartzite and is small. In general gray mottles are more numerous in the lower subsoil layer in the flatter areas of this soil and red

mottles in the more rolling areas. In scattered areas the surface soil is well-defined very fine sandy loam and the yellow color of the upper subsoil layer is more pronounced and extends to a greater depth than in the typical soil. On the older remnants of the plateau in the eastern part of the county the lower subsoil layer is more compact, as in a postmature soil.

This soil occupies the high levels of the old terraces of Tennessee River and the remnant of the old plateau in the eastern part of the county. This old terrace has suffered severely from erosion, as streams have cut back into and through the thin layer of the deposit. The old plateau, which is represented by small patches in most parts of the county, is fairly extensive in the east-central and southeastern parts.

Most areas of this soil are gently undulating or fairly level. The formation from which the soil is derived averages about 10 feet in thickness, is rarely more than 20 feet, and in many places is only from 4 to 6 feet thick. The material of the original deposit is fairly uniform and contains little or no gravel. The gravel present is found where it is exposed by erosion and along the edges of areas where they come in contact with the gravel formation. Drainage is well established. The soil is deficient in organic matter and is acid throughout.

Soil of this phase occurs on old river terraces in the southwestern part of the county, in extensive areas between Olivehill and Gillises Mills in the flatwoods section, and in the southeastern part of the county on old plateau remnants. Smaller scattered areas occur on the old terraces of Tennessee River west of Saltillo and elsewhere. From about 20 to 30 per cent of the land is cleared and used for farming. The forest on the old terraces consists almost entirely of post oak, whereas that on the old plateau, which lies at a much higher level, is pine and post oak.

Soil of this phase is fairly extensive and is one of the important potential farming soils of the county. The crops grown are cotton, corn, wheat, oats, cowpeas, red clover, Lespedeza, Bermuda grass, soybeans, cowpeas, potatoes, sweetpotatoes, sorgo, and vegetables. Some home orchards, in which apples and peaches predominate, are found. Cotton is the leading crop, occupying an acreage equal to that of all other crops combined. Yields of cotton average about one-half or three-fourths bale to the acre but range as high as 1 bale on the best farms. Corn yields from 20 to 40 bushels and wheat from 10 to 12 bushels to the acre.

Lespedeza and Bermuda grass are used for pasturage. Clean cultivation is practiced, and little humus is added to the soil. The small amount of fertilizer used is applied largely to cotton. Some superphosphate is used on corn and sodium nitrate on small grains. The small supply of manure is used on small special patches and garden plots.

Land of this kind commands from $5 to $10 an acre in the more remote regions and from $20 to $50 in better locations and where more highly improved.

This soil, like most of the upland soils, is deficient in organic matter, which should be supplied either in manure or cover crops. Lime should be applied at a rate ranging from 500 to 1,000 pounds of burnt lime to the acre every four or five years, especially where

clover or other legumes are to be grown. More legumes should be grown both for hay and to add nitrogen to the soil.

This land is well suited to cotton, which should remain the leading cash crop. This same kind of soil is very successfully used in the production of tobacco in other parts of the State. It is fairly well suited to small grains, and such truck crops as cabbage, beans, and tomatoes should succeed. Where it is located close to the outcrop of Selma chalk, this form of raw lime material can be used to advantage especially where spread on the fields to be used for legumes, at a rate ranging from 1 to 2 tons to the acre. The following rotation is recommended for building up this land: Winter cover crop turned under in spring, followed by a legume (cowpeas or soybeans), next corn, then cotton or grain.

Savannah silt loam, rolling phase.—The rolling phase of Savannah silt loam closely resembles the typical soil. The lower part of the subsoil, however, contains fewer gray mottles and the substratum is redder. As the name implies, the rolling phase occupies the more rolling and broken areas of the terrace where drainage and aeration are better and erosion is more apt to be active.

Areas of this soil lie in two positions, along the outer or serrated edge of the terrace where erosion has removed large bodies of the original deposit, leaving comparatively narrow ridges as a remnant, and along the hill edge of the terrace, in which position they represent a remnant of a still older terrace that has been cut by numerous streams emerging from the hill region. Although these rolling areas are the result of erosion, the surface of the soil is fairly intact, having suffered little from sheet or gully erosion except locally.

Although this soil is rather widely distributed over the terraces of the county its total area is not great. About 30 or 40 per cent of it is cleared and used for crop production and pasture. The forest is identical with that on the typical soil. More than half the cleared area is in pasture, which furnishes poor grazing unless sodded to Bermuda grass or Lespedeza. The small smoother areas under cultivation are devoted to the same crops and approximately the same yields are obtained as on typical Savannah silt loam.

The selling price of this rolling land is slightly lower than of the typical soil, mainly because the fields are small and the slopes have a tendency to erode.

Areas of the rolling phase can be utilized for the same crops and should be handled in the same general manner as Savannah silt loam. The more rolling areas should be sodded to Bermuda grass and Lespedeza, and locust or some other variety of tree or shrub that is suited to this soil and that will arrest erosion should be set out. All areas under cultivation should be terraced to prevent erosion.

Savannah silt loam, eroded phase.—Savannah silt loam, eroded phase, occurs in small areas along the edges of areas of the typical soil where neglect has caused active erosion. This phase is identical to the typical soil except that it is gullied. These eroded areas are largely in pasture, in abandoned fields, or grown up in post oak or other shrubs. They should be terraced to prevent further washing. The land can best be utilized for pasture, but even where sodded it should be terraced. It has a very low agricultural value and detracts from the selling price of farms that include much of it.

The results of mechanical analyses of samples of the surface soil, two layers of the subsurface soil, and four layers of the subsoil of typical Savannah silt loam are given in Table 5.

TABLE 5.—*Mechanical analysis of Savannah silt loam*

No.	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
402301	Surface soil, 0 to 1 inch	0.1	1.6	1.6	6.8	10.0	68.8	11.1
402302	Subsurface soil, 1 to 2 inches	.2	1.3	1.2	5.1	10.5	72.6	8.8
402303	Subsurface soil, 2 to 6 inches	.0	1.0	.8	3.3	7.8	73.5	13.4
402304	Subsoil, 6 to 15 inches	.0	.8	.6	3.0	7.0	65.1	24.2
402305	Subsoil, 15 to 20 inches	.0	.8	.8	4.2	7.4	66.3	20.2
402306	Subsoil, 20 to 30 inches	.0	1.4	1.4	5.8	7.8	66.4	16.6
402307	Subsoil, 30 to 36 inches	.3	1.2	1.4	6.9	5.4	55.3	29.4

ELK SILT LOAM

The surface soil of Elk silt loam is dark grayish-brown mellow silt loam, passing at a depth of 3 or 4 inches into dark-brown mellow silt loam which rests at a depth ranging from 8 to 10 inches on the subsoil of yellowish-brown firm but friable heavy silt loam. This grades at a depth ranging from about 15 to 20 inches into silty clay loam giving way at a depth of 24 inches to yellow or reddish-yellow friable clay loam which breaks along irregular angular lines.

This soil occurs east of Tennessee River in small areas on terraces along streams where the limestone influence is strong. The areas are level or gently undulating, and drainage is well established.

Practically all this land is cleared. It is used for the same crops as Cumberland silt loam, but crop yields are slightly lower owing possibly to the weaker productive power of the land and to the poorer methods of farming practiced. The soil can be improved by the methods recommended for Cumberland silt loam.

KALMIA SILT LOAM

The surface soil of Kalmia silt loam is yellowish-brown or light-brown floury mellow very fine sandy loam or silt loam underlain, at a depth ranging from 5 to 10 inches, by yellow or buff-colored firm but friable finely granular very fine sandy clay or silty clay loam. Below a depth ranging from 15 to 20 inches the material becomes mottled with pale gray and gray. The mottling increases with depth. Between depths of 24 and 40 or more inches is very compact finely granular pale gray or gray material mottled with bluish-gray and yellow and showing irregular angular breakage. Some areas of very fine sandy loam are included with mapped areas of this soil.

Kalmia silt loam occupies rather low terraces, which in few places rise to a height of 30 feet above stream level. The relief is level or gently sloping. Surface drainage is well established, but the heavy texture of the substratum prevents free underdrainage. The soil is acid throughout and is deficient in organic matter. It occurs mainly in rather small detached areas along the larger streams which enter Tennessee River from the west.

Practically all the land of this kind is cleared and under cultivation. On the small timbered areas the growth is composed al-

most entirely of hardwoods, among which oak predominates. Cotton is the leading crop, with some corn, oats, wheat, cowpeas, soybeans, Lespedeza, and Bermuda grass. Crop yields vary considerably according to management. Cotton ordinarily yields from one-half to three-fourths bale to the acre but as high as 1 bale where heavily fertilized, corn from 25 to 45 bushels, oats from 15 to 25 bushels, wheat from 10 to 12 bushels, and hay about 1 ton.

Little fertilizer is used except on cotton, which receives from 150 to 300 pounds to the acre of a 4–8–4 grade. As on other terrace soils, clean cultivation is the practice and little organic matter is added. Lime is not used.

The selling price of land of this kind ranges from $20 to $50 an acre, depending on location and improvements.

Organic matter should be added to this soil by turning under cover crops. More legumes should be grown, especially Lespedeza. The land is fairly well suited to cotton and vegetables. Such truck crops as cabbage, onions, tomatoes, potatoes, and beans can be grown where properly fertilized. Liming should be practiced where legumes such as clover are to be grown.

ROBERTSVILLE SILT LOAM

In virgin areas the 2 or 3 inch surface layer of Robertsville silt loam is gray floury silt loam or very fine sandy loam faintly mottled with yellow and brown and containing some organic matter. It is underlain to a depth of 5 or 6 inches by light-gray floury silt loam mottled with yellow and having a flaky breakage. This grades into firmer though not compact gray silty clay mottled with brown and having an angular or blocky breakage. Below a depth ranging from 15 to 20 inches imperfectly weathered material consisting of whitish or drab-gray heavy silty clay loam with a few small splotches of yellow or yellowish brown is reached. This compact layer is slightly tough and has an angular breakage. Below a depth of 30 inches it gives way to unweathered very highly mottled gray and yellow, with traces of brown, fine sandy clay which is rather tough and has an irregular breakage.

This soil is very inextensive, occurring in comparatively small areas in low level positions on terraces or in slight depressions. Both surface and internal drainage are poor. In wet seasons shallow ponds of water stand in the lower places. The soil is strongly acid throughout.

Little of this soil is cultivated, but it is extensively used for pasture and furnishes good grazing even in dry seasons. On forested areas there is a rather scattered growth of post oak and water oak.

Because of its small area and its location, the selling price of this land is governed by that of surrounding soils, mainly Savannah silt loam.

Where properly drained Robertsville silt loam is fairly well suited to cotton and corn. Oats, Lespedeza, and other shallow-rooted crops, especially strawberries and grasses, should do well. Where drained, this land should receive not less than 1 ton of burnt lime to the acre after the first season.

CAHABA FINE SANDY LOAM

The surface soil of Cahaba fine sandy loam is light-brown mellow fine sandy loam. It is underlain at a depth of 6 or 8 inches by reddish-yellow or buff-colored slightly compact friable crumby fine sandy clay which continues to a depth of 2 feet, at which depth it becomes slightly more compact but contains more fine sand than the layer above. It is friable and retains the yellowish-red color of the surface soil. Below a depth ranging from 4 to 5 feet some yellow mottles and, in some places, gravel are present. Some areas of very fine sandy loam texture are included in mapping.

This soil occurs on the smooth or level terraces of the larger streams, except Tennessee River, and a few areas are along this river below the mouth of large streams entering from the coastal-plain region. Drainage is excellent, and aeration is good. The soil is acid throughout. The material from which it is derived is largely of coastal-plain origin. The largest areas are on White Oak Creek and on Mud Creek south of Morris Chapel, along the lower reaches of Horse Creek and Chambers Creek, and in scattered areas along Tennessee River mainly near Hamburg and Counce.

Practically all the land is cleared and under cultivation. The few remaining trees are largely hardwoods. Cotton, corn, wheat, oats, soybeans, cowpeas, and clover are grown. Cotton is the principal crop. Crop yields are fairly good. Cotton yields from one-half to 1 bale to the acre, corn from 30 to 50 bushels, wheat from 10 to 12 bushels, and oats from 15 to 30 bushels. Cowpeas and crabgrass make fair yields of hay.

Farming methods are fairly good. Commercial fertilizer is depended on to maintain fertility. Little organic matter is incorporated with the soil, clean cultivation being the general practice. The depth of plowing averages about 8 inches.

Land of this kind sells at prices ranging from $20 to $60 an acre, some land in better locations bringing more.

Cahaba fine sandy loam is deficient in organic matter, which can be supplied by turning under cover crops. More legumes should be grown, especially clover, vetch, and cowpeas. Besides being one of the best cotton soils in the county this land is especially suited to the production of such truck crops as cabbage, potatoes, sweetpotatoes, tomatoes, and beans. Complete fertilizer should be used with cotton and truckers' fertilizer with vegetables. Where large amounts of organic matter are turned under and lime is used, the amounts of commercial fertilizer can be materially reduced.

HUNTINGTON SILT LOAM

The surface soil of Huntington silt loam, where typically developed in the bottoms of Tennessee River, is brown mellow silt loam underlain at a depth ranging from 10 to 15 inches by yellowish-brown slightly compact finely granular mellow silty clay loam. In other locations, especially in bottoms which receive frequent overflows, the surface soil is brown or dark-brown heavy silt loam. Below a depth ranging from 10 to 15 inches is dark yellowish-brown finely granular rather compact silty clay having a blocky breakage. This continues to a depth ranging from 24 to 30 inches and gives way to dark yellowish-brown rather compact coarsely granular very fine sandy clay having

a blocky breakage. The depth to the dark-brown coarsely granular heavy layer differs considerably, in places being only 10 or 12 inches. Locally this land is known as buckshot land. In higher positions the surface soil is light brown or yellowish brown to a depth of 10 inches and is underlain by a brownish-yellow friable subsoil which grades into brownish, yellowish, yellow, or pale-yellow material containing a few faint mottles of gray and brown at a depth of 3 feet. Along the smaller streams that derive their sediments from limestone material the surface soil to a depth of 6 or 8 inches is dark brownish-gray floury silt loam passing into dark yellowish-brown mellow but firm silt loam having a somewhat flaky breakage which grades at a depth ranging from 15 to 20 inches into brownish-yellow granular slightly tight silty clay loam of angular or blocky breakage and containing a few small splotches of gray and some black iron concretions near the bottom of the layer. Below a depth of 36 inches there is pale yellowish-brown fairly loose friable very fine sandy clay, noticeably mottled with yellow and gray. In a number of included areas the surface soil is loam.

Huntington silt loam is first-bottom overflow land. It occurs in scattered areas along Tennessee River and along the larger streams that receive much of their drainage water from limestone material. It lies from 5 to 15 feet above stream level along the smaller streams and from 15 to 30 feet along Tennessee River. Most of this soil along the smaller streams is inundated annually, but along Tennessee River several years may elapse between floods. A large quantity of soil material is added to most areas at each overflow. Drainage is well established, the water draining out readily after the recession of the floods. The surface soil, subsoil, and substratum have good moisture-holding capacity. This soil rarely suffers from lack of moisture during severe droughts as the moisture is drawn by capillary attraction from the water level of the river. Areas are level or gently rolling, as is characteristic of river-bottom land. The soil is generally mildly acid throughout, though tests show it to be neutral in a few places and alkaline in a few others.

Nearly all the Huntington silt loam is cleared and under cultivation. The few remaining trees are cottonwood, white oak, elm, ash, water oak, sweetgum, sycamore, hickory, and walnut. Dense canebrakes form the underbrush. Horseweed is the principal pest. The cleared areas are devoted almost entirely to corn, but some small areas are in wheat, oats, alfalfa, clover, grass, soybeans, and cotton. Corn yields from 40 to 80 bushels to the acre, according to the season and to the length of time elapsing between overflows. The heaviest yields follow overflows. Wheat has a tendency to lodge, and much of the crop is often lost in this way. Soybeans furnish good yields of hay, clover does well, and alfalfa fairly well. Cotton returns from about three-fourths to 1 bale to the acre and grass from about 1½ to 2 tons of hay.

Very few houses are built on this kind of land, as all the farmers live on the uplands. A few shacks in which workers live during the rush season have been built. The land has a tendency to clod badly when plowed too wet. Harrows and clod crushers are used to break the clods and rollers and cultipackers to conserve the moisture in the seed bed between breaking and planting time. Two-horse cultivators are in common use, and many tractors are used.

Little of this land is on the market. Sale prices range from $75 to $100 an acre in the river bottoms and from $50 to $65 in other locations.

This soil is naturally strong and areas which are overflowed require little fertilizer and few changes of crops, but where several seasons pass without floods the land should be handled in much the same manner as the upland soils. More clover should be grown, and now and then a crop should be turned under.

Huntington silt loam, high phase.—In forested areas the high phase of Huntington silt loam has a surface layer of grayish-brown finely granular mellow loam or silt loam which is darkened to a depth of 1 inch with organic matter and to the same depth contains roots and rootlets. At a depth of 4 or 5 inches this is underlain by brownish-yellow friable granular loam having an angular breakage, which at a depth of 10 or 12 inches grades into yellow silty clay loam having a blocky or angular breakage and finely granular structure. This layer passes at a depth ranging from 20 to 24 inches into pale-yellow silty clay loam which is slightly compact, is friable, and is of the same general structure as the layer above. Below a depth ranging from 30 to 36 inches is finely granular and slightly compact bright-yellow very fine sandy clay which has an irregular angular breakage. In cultivated fields the surface soil is grayish-brown or brown mellow very fine sandy loam or loam, passing at a depth of 5 or 6 inches into yellowish-brown mellow loam which extends to a depth of 10 or 12 inches. A number of areas having fine sandy loam surface soils and small areas of loam texture are included with soil of this phase in mapping.

Soil of this phase occupies comparatively high bottoms that are seldom overflowed but receive a deep inundation about once in 10 years. The land lies from about 30 to 40 feet above the normal stream level, and drainage is good. Areas are fairly level or gently undulating, in many places occupying swells or ridges from 5 to 10 feet higher than the general level of the surrounding bottoms. In many places the outer edge of this second bottom is marked by a well-defined escarpment. Most of this soil is underlain by thin gravel beds at a depth ranging from 5 to 6 feet below the surface.

This soil occurs in many parts of the Tennessee River bottoms in long narrow areas separated by narrow sloughs. It is nearly all under cultivation. The remaining forest consists mainly of white oak, hickory, sweetgum, ash, and elm trees. Cotton, corn, wheat, grass, Lespedeza, and soybeans are the principal crops grown. Cotton yields about three-fourths bale to the acre, corn about 50 bushels, wheat from 10 to 12 bushels, and hay from 1½ to 2½ tons.

The soil is handled in much the same manner as the upland soils, as it is seldom overflowed. Only a few farmers have adopted the use of fertilizer, but most of them practice crop rotation to some extent.

This land sells at prices ranging from $50 to $75 an acre.

As most of the soil is deficient in organic matter, cover crops should be grown and turned under to improve the physical condition. Fertilizers should be used, especially on cotton, at a rate of not less

than 300 or 400 pounds of a 4–10–4 mixture to the acre. Liming would prove beneficial, as the land is acid throughout. About 1,000 pounds of lime to the acre would be required where clover is to be grown. Soil of this phase is well suited to cotton, small grains, and grasses. Crops should be rotated. For the first years following an overflow this land can be used for corn to good advantage; at other times this crop should not be planted.

Huntington silt loam, dark-brown phase.—The surface layer of the dark-brown phase of Huntington silt loam is dark-brown or almost black mellow finely granular silt loam or loam which is high in organic matter and is 4 or 5 inches thick. The subsurface layer is dark-brown mellow silt loam, slightly heavier and firmer than the surface layer and having an irregular angular breakage and granular structure. This material grades at a depth ranging from 15 to 20 inches into slightly firm granular brown silt loam having an irregular angular breakage. Beginning at a depth of 30 inches is yellowish-brown or yellow silty clay loam having a blocky or flaky breakage. The sand content increases sharply below a depth ranging from 36 to 48 inches, and the material becomes friable but not compact brownish-yellow fine sandy loam slightly streaked or mottled with gray and yellow and containing a quantity of finely divided mica flakes.

The dark color of this soil is caused by the presence of organic matter which has been derived from several sources and distributed along the stream banks during floods. Some of the organic matter is derived from the dense canebrakes along the stream edge, some from the great piles of corncobs left to disintegrate along the banks of the river after the enormous corn crops on the bottom land have been shucked and shelled, some from the residue of shucks and fodder fed to livestock, and possibly some from residue left in clearing new land. Some of the darker areas contain remains of Indian habitations.

This dark Huntington soil occurs in comparatively narrow intermittent strips along the river edge of the bottoms, in close association with Huntington fine sandy loam. Although not extensive, it is fairly important agriculturally. Most of it is cleared and used for the same crops as the typical soil. Crop yields are about the same on the two soils. This phase is probably better suited to alfalfa than typical Huntington silt loam.

HUNTINGTON SILTY CLAY LOAM

Huntington silty clay loam closely resembles Huntington silt loam but is heavier textured, of more definite blocky breakage, and more granular. The fracture planes are in no place definite and the angles of the cleavage planes are sharper than in Huntington silt loam. A large number of small iron concretions is present throughout the soil.

Areas of this soil are fairly level or slightly undulating and occupy low bottoms that are fairly well drained. Most of the soil occurs on the Tennessee River bottoms near the mouths of streams that enter Tennessee River, in situations where backwater stands for long periods and the finer sediments are allowed to settle. It is not an extensive soil, but most of it is cleared and used for farming. The

remaining forest consists of hardwoods, white oak, sweetgum, elm, hackberry, ironwood, and ash.

Corn, cotton, grass, and small grains are practically the only crops grown. Crop yields are good, as this is one of the strongest soils in the county. Corn yields from 50 to 70 bushels to the acre, hay about 2 tons, and cotton about 1 bale unless there is too much rain or weevil interference. Grains have a tendency to lodge but otherwise make good yields.

No fertilizer is used, and no cover crops are turned under. This land is inundated more often than most of the river-bottom soils, and for this reason the productivity endures longer than in the higher bottoms. The material clods badly when plowed even in a slightly moist condition. It is necessary to harrow the land thoroughly and roll with rollers or cultipackers in order to break clods and conserve moisture. This soil is not much sought after by some renters, although it produces well. It sells at prices ranging from $40 to $100 an acre.

This land is naturally strong. Much of the original organic-matter content has been removed. This allows the land to run together badly and to pack after rains, forming a hard crust. This defect can be overcome by turning under stubble and cover crops. The soil is well suited to grasses and corn and is fairly well suited to cotton. Such deep-rooted crops as sweetclover should be grown to improve the physical condition of the soil.

HUNTINGTON FINE SANDY LOAM

Huntington fine sandy loam as typically developed along Tennessee River, where it occurs mainly along the stream edge in comparatively narrow strips and in wider areas in the convex bends, has a brownish-gray mellow fine sandy loam or very fine sandy loam surface soil underlain at a depth ranging from 8 to 10 inches by dark grayish-brown mellow firm fine sandy loam which extends to a depth of 18 or 20 inches before grading into yellowish-brown slightly compact heavy silt loam or silty clay loam faintly mottled with gray and yellow and having a blocky breakage. Below a depth ranging from 30 to 36 inches the subsoil grades into mottled gray, yellow, and brown heavy compact fine sandy clay or silty clay of a blocky or angular breakage. All soil tests show a mildly acid condition. Included in mapping are a number of loamy fine sand areas consisting of grayish-brown mellow fairly loose loamy fine sand passing at a depth ranging from 15 to 20 inches into yellowish-brown slightly compact loamy fine sand, which extends to a depth of 3 or more feet. This included soil occurs along the stream edges and at the heads of the larger streams. Drainage in these areas is inclined to be excessive.

The texture of this soil occurring along the smaller streams may range to very fine sandy loam and the surface soil may be grayish yellow, grading at a depth of 6 or 8 inches into yellowish-brown firm but mellow very fine sandy loam which becomes yellower and slightly more compact with depth. Land of this kind is extensive along Horse Creek and less extensive along Indian Creek.

Areas of this soil are fairly level or gently undulating. Drainage is excessive. Nearly all the land is cleared, except for a narrow strip

along the river edge where thick canebrakes occur. The principal trees are water oaks, sycamore, elm, cottonwood, ash, and birch. The soil is used extensively for corn and to less extent for cotton, small grains, grass, and soybeans. It is well suited to such legumes as cowpeas, vetch, and peanuts and also to rye, melons, and potatoes and other vegetables. Crop yields are slightly less than on Huntington silt loam. The land is easy to work and is preferred by some farmers on this account.

Land of this kind sells at prices ranging from $50 to $100 an acre.

Huntington fine sandy loam, gravelly phase.—The gravelly phase of Huntington fine sandy loam has a grayish-brown or grayish-yellow surface soil from 6 to 8 inches in thickness, which contains considerable chert gravel. This layer passes into yellowish-brown firm but friable fine sandy loam which also contains a noticeable amount of chert gravel. This layer becomes more compact and paler yellow in color with depth and in most places is underlain at a depth ranging from 30 to 36 inches by gravel beds consisting of angular blocky and rounded chert fragments.

This gravelly soil occurs near the headwaters of streams which rise in the chert region of the eastern part of the county. Areas are fairly level, and both surface and internal drainage are good. Much of the land is cleared, and the remainder is in hardwood forest of white oak, hickory, walnut, and beech, with a scattered growth of sweetgum and sycamore.

The cleared areas are used chiefly in the production of cotton, corn, small grains, grass, and clover. Crop yields are good.

The selling price of this land ranges from $25 to $65 an acre.

This gravelly soil is well suited to cotton or small grains and is fairly good corn land. More legumes should be grown, especially clover. The gravel does not seriously interfere with cultivation.

Huntington fine sandy loam, high phase.—The surface soil of Huntington fine sandy loam, high phase, is brown mellow fine sandy loam to a depth of 6 or 8 inches. This is underlain by yellowish-brown fairly firm but friable sandy clay loam which becomes slightly more compact and more yellow with depth. At a depth ranging from 30 to 36 inches the material has a tendency to become lighter in texture and more friable and is faintly mottled with brown and gray.

Soil of this kind occupies the high bottoms of Tennessee River, which are subject to only occasional overflow and which receive very little deposit from the streams. It is intermediate between the terraces and the bottom land. The areas occur on fairly smooth or gently undulating bottoms on swells or ridges running in the direction of the main stream current and usually separated from other soils by long narrow sloughs. Drainage is well established.

Practically all this land is cleared and utilized for farming. The few remaining trees, typical of the river bottoms, are white oak, sweetgum, ash, hackberry, elm, and hickory. The farmed areas are devoted to cotton, corn, oats, wheat, soybeans, Lespedeza, and grasses. Cotton yields from about three-fourths to 1 bale to the acre when light applications of fertilizer are applied, corn from 25 to 40 bushels, wheat from 8 to 10 bushels, and hay from 1 to 1½ tons. This soil is handled in much the same manner as the

other higher bottom soils. The selling price ranges from $40 to $75 an acre, according to location and state of cultivation.

The farming methods recommended for the high phase of Huntington silt loam would be good practice on this soil. This is a lighter-textured soil, containing a higher proportion of silica in the surface soil, and for this reason should receive larger amounts of fertilizer.

LINDSIDE SILT LOAM

The surface layer of Lindside silt loam is grayish-brown mellow silt loam from 6 to 8 inches in thickness. It is underlain by yellowish-brown heavy silt loam which continues to a depth ranging from 15 to 20 inches before passing into brownish-yellow firm silty clay loam mottled with brown and gray. This material becomes more intensely mottled and slightly more compact with depth. Some small black iron concretions are present throughout the soil.

Lindside silt loam occurs on the larger creeks that derive their drainage from a region that contains much limestone. The total area of this soil is not large and it is not important agriculturally. Crop yields are slightly less than on Lindside silty clay loam and Huntington silt loam.

Lindside silt loam, high phase.—The surface soil of the high phase of Lindside silt loam is grayish-brown or brown mellow floury silt loam, which at a depth of 6 or 8 inches passes into yellow firm friable finely granular silty clay loam having a flaky breakage. At a depth ranging from 12 to 15 inches this layer is underlain by yellowish-brown, mottled with gray and brown, finely granular heavy slightly sticky very fine sandy clay of irregular angular breakage. Below a depth ranging from 18 to 24 inches highly mottled yellow, brown, and gray compact brittle friable fine sandy clay containing some iron concretions is reached. Below a depth of 36 inches the material becomes drier.

This soil occupies high bottoms along Tennessee River. The areas lie above normal overflow and are flooded about once in every 10 years. The amount of sediment left after each inundation is small. The land is fairly level or gently undulating. Surface drainage is good, but internal drainage is imperfectly established.

Most of this land is cleared and used for crops. The remaining tree growth is white oak, water oak, sweetgum, elm, and hornbeam. The crops grown are cotton, corn, wheat, soybeans, and grass. Cotton yields from one-half to three-fourths bale to the acre, with the better-farmed land producing about 1 bale, corn from 40 to 50 bushels, wheat from 8 to 12 bushels, and grasses from about 1½ to 2 tons of hay.

This land is handled in the same manner as the rest of the high bottoms. Little recognition is given to the fact that it is seldom overflowed, except that less corn is planted than on other bottomland soils. Little or no fertilizer is used and other methods for building up productivity of the land are not practiced.

The same farming practices should be used on this land as are recommended for the high phase of Huntington silt loam. Most of this soil is deficient in organic matter, and this should be added by growing legumes and turning under stubble and cover crops.

The soil is fairly well suited to soybeans, Lespedeza, and cowpeas, and can be used for small grains and cotton. It should not be used for corn, as better cornland lies in the immediate vicinity.

LINDSIDE SILTY CLAY LOAM

Lindside silty clay loam closely resembles Lindside silt loam. The heavier texture of the silty clay loam soil has some influence on the nature and structure of the subsoil, in which the breakage is decidedly more blocky and the structure more granular. Because of the larger clay content there is more shrinkage in dry seasons, causing fissures and cracks to develop. As Lindside silty clay loam is a young soil these cleavage planes are not permanent but change more or less with each shrinking or expansion. The subsoil is more plastic when wet than the subsoil of Lindside silt loam.

Soil of this kind occupies medium-high fairly level bottoms. The surface drainage is fairly well established, but internal drainage is retarded both by the heavy substratum and the location of the water table. This soil occurs almost entirely in the Tennessee River bottoms and along the streams entering this river where backwater stands for long periods.

Most of this land is cleared, but some areas of the original forest, consisting of white oak, sweetgum, hickory, ash, red elm, and ironwood, are left. The cleared areas are devoted amost wholly to corn, with smaller acreages in grass and cotton. Crop yields are good, except in wet seasons, comparing favorably with those on Huntington silty clay loam.

This land is handled in the same manner as Huntington silty clay loam. As it has a somewhat higher water table, more care must be given it at plowing time. Like other heavy bottom-land soils, it clods badly. Tests show the surface soil to be mildly acid and the subsoil strongly acid.

Land of this kind sells at prices ranging from $50 to $100 an acre.

The lower parts of this land should be drained in order to lower the water table. After this is done the soil is suited to the same crops as Huntington silty clay loam and should be handled in the same manner.

Lindside silty clay loam, low phase.—Areas of the low phase of Lindside silty clay loam occupy swales and narrow strips of low drainage ways throughout the bottoms of Tennessee River, generally in association with the typical soil. The low phase differs from the typical soil in that the surface soil contains slightly more organic matter and the mottling in the subsoil is slightly more pronounced.

Most of the land of this phase is in forest of the same general character as that on the typical soil but with a larger proportion of gum, alder, soft maple, and ironwood. Most of the cleared areas have been drained with open ditches. The land it utilized for corn and hay, which produce good crops. This lower-lying land is inundated twice as often as Lindside silty clay loam. It should be thoroughly drained.

This soil, occurring as it does in long narrow strips, is included with other bottom land when sold, and no definite selling price can be fixed for it.

HOLLY SILT LOAM

The surface layer of Holly silt loam, where forested, is dark brownish-gray mellow silt loam faintly mottled with gray and rust brown. To a depth of 1 inch it contains some organic matter and is slightly darker. It grades at a depth of 3 or 4 inches into brownish-gray floury silt loam faintly mottled with gray and brown, which grades at a depth of 6 or 8 inches into firm and mellow grayish-brown very fine sandy clay or silty clay strongly mottled with yellow, dark brown, and gray. This layer gives way at a depth ranging from 15 to 20 inches to slightly tough yellow fairly heavy silty clay coarsely mottled with gray and rust brown. Below a depth ranging from 30 to 36 inches the material is predominantly gray finely granular highly compact tough silty clay mottled with yellow and brown, having a blocky breakage and containing imperfectly formed iron concretions. The soil is strongly acid throughout.

Areas of this soil are level, occupying low sloughs in the back bottoms of Tennessee River and other streams which are influenced by limestone. Both surface and internal drainage are poor. Only a comparatively small area of the land is cleared. The remainder, which amounts to 90 per cent, is in forest consisting of sweetgum, cypress, black gum, willow, alder, hackberry, sycamore, and other water-loving trees. Water stands on the surface throughout most of the year. The cleared areas are used almost entirely for pasture and furnish fair grazing of native grasses and Lespedeza. Bulrushes and alder are the chief pests in the pastures.

In its present condition this land has a very low agricultural value. By putting a large drainage canal through this back-bottom slough, the land would be made available for cropping. Under better drainage conditions it would be suited to the same range of crops as the Lindside soils.

HOLLY SILTY CLAY LOAM

Holly silty clay loam is identical with Holly silt loam except that the surface soil is silty clay loam in texture. It occurs in like positions and under the same conditions as the silt loam but is found almost entirely in the back bottoms of the Tennessee River flood plain. The timber growth and soil usage are practically the same as on Holly silt loam.

Holly silty clay loam, high phase.—The surface soil of the high phase of Holly silty clay loam is dark-gray friable mellow silty clay loam moderately mottled with grayish brown and yellow. It is more or less blocky or flaky in breakage and grades, at a depth ranging from 4 to 6 inches, into yellowish-gray or gray sticky silty clay strongly mottled with yellowish brown and having a blocky breakage. At a depth ranging from 10 to 15 inches this layer is underlain by highly mottled yellow, brown, and gray fairly firm sticky plastic silty clay which also has a blocky breakage. The lower part of this layer is saturated with water. Below a depth of 30 inches the material is very compact impervious brittle or friable finely granular fine sandy clay or silty clay, mottled yellow and gray with some brown and having a blocky breakage. This layer is much drier than the layer above. The soil is acid through-

out and contains a quantity of iron concretions from the surface down to a depth of 4 or more feet.

This soil is inextensive, occurring only in a few areas in the large river bottoms southwest of Savannah. It occupies high level back-bottom land which is seldom overflowed by flood waters but is so situated that water stands on the surface in all except very dry seasons. Both surface and internal drainage are poor.

Very little of this land is used for crops. It supports a forest growth of water oak, swamp maple, elm, sweetgum, and hickory. Most of the small cleared areas are in pasture, but small acreages are in cotton, corn, small grains, and grass. Crop yields are low.

The agricultural value of the soil is low, and the price is dependent on the value of the adjacent river-bottom soils.

If this land were drained, limed, and enriched in organic matter it would produce fair yields of the crops common throughout the river bottoms, especially small grains and grasses. However, as there is an abundance of well-drained arable land better suited to these crops, such expense would not be warranted.

OCHLOCKONEE VERY FINE SANDY LOAM

The surface layer of Ochlockonee very fine sandy loam is dark brownish-gray or yellowish-brown mellow floury very fine sandy loam. This is underlain at a depth of 6 or 8 inches by firm friable finely granular brownish light fine sandy clay loam or heavy fine sandy loam having an irregular angular breakage and containing some rounded gravel. At a depth ranging from 15 to 20 inches this gives way to brownish-yellow slightly compact finely granular friable light sandy clay, faintly mottled with brown and gray and having an angular breakage. Below a depth ranging from 24 to 30 inches the material is mottled gray, brown, and yellow gravelly sandy loam or loamy sand. The mottling begins at various depths below the surface. In some areas there is no mottling to a depth of 3 feet and in many places little gravel is present to that depth. In the southwestern part of the county many areas are fine sandy loam in texture.

The principal development of Ochlockonee very fine sandy loam is on the smaller streams that receive the wash from the coastal-plain soils. This soil is well distributed over the county. Areas are fairly level, but the bottoms lie sufficiently high to allow good surface drainage. In many places internal drainage is retarded, causing a mottled appearance in the deeper part of the subsoil. The soil is acid throughout.

This is one of the minor bottom-land soils, but probably from 50 to 60 per cent of it is cleared and used for farming. A fairly large area of the cleared land is used for pasture. Cotton, corn, oats, and grasses are the principal crops. The forest growth consists of sweetgum, elm, sycamore, willow, birch, and alder. Corn yields from 35 to 45 bushels to the acre, cotton from about one-half to three-fourths bale, and other crops do fairly well. Lespedeza and Bermuda grass make good stands. Only small areas are cut for hay, but yields are fair. This land is subject to frequent overflows, and little fertilizer or manure is used.

Land of this kind sells at prices ranging from $35 to $50 an acre, depending on location and condition. The price of land lying in small bottoms is governed by the price of the surrounding land, but the larger bottoms are more valuable than the adjoining hill land.

More legumes should be grown. The soil is well suited for cowpeas, Lespedeza, and vetch. Although frequently overflowed, the deposits left are not heavy, and most areas of this soil are deficient in organic matter. This is fair cotton and corn land and is also well suited to melons and vegetables.

OCHLOCKONEE SILT LOAM

The surface layer of Ochlockonee silt loam is grayish-yellow floury silt loam from 5 to 7 inches in thickness. It is underlain by brownish-yellow mellow friable finely granular silt loam which grades at a depth ranging from 15 to 18 inches into slightly sticky brownish-yellow light silty clay loam faintly mottled with gray. Below a depth ranging from 24 to 30 inches is yellowish-brown silty clay mottled with gray and yellow and containing a few small iron concretions.

Areas of this soil are fairly level and drainage, though not quite so well established as in Ochlockonee very fine sandy loam, is much better than in the Bibb soils. Most of this soil occurs in the bottoms of the larger creeks that enter Tennessee River from the west, especially along Lick Creek Canal, Mud Creek, and White Oak Creek. Most of the deposits it receives are from coastal-plain material. Canals and open ditches serve to remove much of the surplus drainage water.

Most of this soil is cleared and used for farming. The small forested acreage is covered with a substantial growth of white oak, water oak, sweetgum, tulip poplar, elm, and alder. Corn, cotton, oats, and grass are the leading crops, corn occupying an acreage equivalent to the combined acreage of the other crops. Corn yields from 40 to 60 bushels to the acre, cotton from three-fourths to 1 bale, oats from 20 to 35 bushels, and hay from 1½ to 2 tons.

This land is handled in the same manner as other bottom-land soils of the county. Areas, except along the larger streams which have been canalled, are subject to frequent overflows.

Ochlockonee silt loam generally commands from $50 to $75 an acre. Areas in the most favorable locations are priced somewhat higher.

This soil is well suited to corn, is fairly good for cotton, and produces good yields of most crops that can be grown on bottom soils. Some of the land is in need of tile drainage. In dry years crop yields are excellent, but in wet seasons cotton, especially, is inclined to drown out.

BIBB SILT LOAM

To a depth ranging from 5 to 7 inches the surface layer of Bibb silt loam is dark yellowish-gray finely granular mellow silt loam. This is underlain by dark yellowish-gray firm friable finely granular silt loam having a flaky or angular breakage. At a depth ranging from

15 to 18 inches the material gives way to a predominantly gray, mottled with yellow and yellowish-brown, silty clay loam or silty clay layer containing small black spots caused by the disintegration of iron concretions. Between depths of about 30 inches and 3 or more feet there is mottled yellowish-brown and black very fine sand or silty clay loam. In canalled areas the water table lies at a depth ranging from 6 to 7 feet, but on other areas water stands on the surface during the greater part of the year and the water table is rarely lower than 3 feet even in dry seasons.

Bibb silt loam occupies low bottoms along the larger streams of the coastal-plain region where both surface and internal drainage are poor. Areas are almost level. The streams have a very meandering course, with sluggish currents and in places have a tendency to spread out over the bottoms. Some of this soil occurs in the low back bottoms where poor drainage conditions exist. The largest areas lie in the large bottoms of streams that are tributary to White Oak Creek.

Most of the land is covered with forest consisting of white oak, water oak, sweetgum, maple, ironwood, and alder. The drained areas are used in the production of corn, cotton, and hay, and for pasture. Corn yields from 40 to 65 bushels to the acre depending on the season, and cotton from about three-fourths to 1 bale in dry seasons and about one-fourth bale in wet seasons. Hay does well in nearly all seasons. Lespedeza, carpet grass, and Bermuda grass furnish good pasturage.

Where drained the price of this land ranges from $5 to $75 an acre. The uncleared and undrained areas sell at a comparatively low price.

Even canalled areas of this land are in need of lateral drainage ditches and much of the soil should be tile drained. It is a naturally strong soil and is worth improving. Where properly drained it is well suited to corn, small grains, grass, and cotton.

BIBB VERY FINE SANDY LOAM

Bibb very fine sandy loam very closely resembles Bibb silt loam. The lighter texture gives rise to a more floury or mealy surface soil. The upper part of the subsoil is tighter but the lower part is inclined to be rather tough and sticky when wet.

This soil occupies low fairly level bottom land in the western part of the county, occurring along streams that receive their drainage from coastal-plain material. Surface and internal drainage are poor. In the southwestern part of the county, the texture of the soil ranges toward fine sandy loam. The outstanding feature of this land is the high water table, which stands near the surface throughout most of the year.

Although most of this land has been drained by canals and ditches only a comparatively small area is used for crops. The forest consists mainly of white oak, water oak, sweetgum, hickory, maple, and ironwood. The small cleared area is in pasture, corn, and hay. Crop yields are fairly good but range a little lower than on Bibb silt loam. This soil should be handled in the same manner as other poorly drained bottom lands.

ROUGH STONY LAND

Rough stony land embraces all stony ground that is either too stony or too steep for farming. Most of it occurs along the stream bluffs where limestone outcrops. The soil is predominantly Hagerstown material, with some Fairmount and a little Ruston. Areas of rough stony land are scattered over the eastern half of the county, most of them occurring as narrow strips along the hill edge of the bottom land along Horse, Indian, and Hardin Creeks.

This land has little or no agricultural value and should be left in forest.

RIVER WASH

River wash consists of sand and gravel which has been piled up, usually as bars, in the river. Some areas represent soils from which the surface soil has been removed by the river, exposing beds of gravel. This material has little or no agricultural value.

SUMMARY

Hardin County, which includes an area of 589 square miles, is in the southwestern part of Tennessee. It is well supplied with water transportation, and a number of improved roads connect with railroad points outside the county. There are no railroads in the county.

The climate is mild and humid and is marked by short but rather cold winters and long hot summers. Both growing and grazing seasons are long, and the rainfall, which is ample for growing crops, is well distributed throughout the growing season.

The county lies in that section of the United States where the formations of the coastal plain overlap the western edge of the highland rim. In general the two regions are separated by the broad but deeply incised valley of Tennessee River which extends north in a meandering course through the west-central part of the county. The flood plain of this river averages several miles in width and is flanked by terrace developments which are more extensive on the west side of the river. The highland plateau is a severely dissected or hilly region except in the southeastern part where comparatively broad flat-topped ridges have developed. The coastal plain lying to the west is lower, less dissected, and much smoother. The terraces are badly eroded although many extensive level areas are still intact. With the exception of small swales in the bottoms and a few level poorly drained areas on the terraces the county is well drained.

Physiographically the soils fall into four classes as follows: (1) Residual soils derived from limestone and associated rocks; (2) residual soils derived from unconsolidated gravel, sand, and clay of the coastal-plain formations; (3) terrace or old alluvial soils; and (4) first-bottom or recent alluvial soils. The soils have been formed under humid climatic conditions which allowed leaching of the carbonates and other soluble salts and the accumulation of finer earth material in the lower layers of the mature soils. Little accumulation of organic material has taken place on the surface.

The soils of Hardin County are mapped in 22 soil series, represented by 30 soil types and 15 phases of types. In addition to these, two classes of miscellaneous material are mapped.

The present agriculture consists mainly of the growing of corn, together with cotton, small grains (oats and wheat), soybeans, and clover and grasses for hay. Most of the corn is grown on the bottom land and other crops mainly on the upland. Much of the river-bottom land is rented. The small amount of commercial fertilizer used is applied for cotton. Some cattle and hogs and a number of chickens are kept on the farms. Timbering is an important industry, especially in the eastern half of the county.

The soils are well suited to general farming, stock raising, and fruit and vegetable growing. With transportation facilities as they are at present it is doubtful if either fruit or vegetable production on a commercial scale would be profitable. The production of cotton might well be extended to the high bottoms, terraces, and table-lands in the southwestern part of the county. Tobacco might be introduced in the farming scheme, as this crop, like cotton, can be easily transported. The growing of general farm crops with more legumes, in addition to livestock raising, is recommended for the limestone and associated soils. The bottom land is highly suited to the production of corn, and no other crop under the present economic conditions can take its place. The high or back bottoms of Tennessee River are seldom inundated and in stage of development are similar to the upland soils. They should be handled in like manner. Much of the rougher land should remain in forest, and eroded land should be reforested. The heavier or limestone soils are suited to hardwoods and the lighter soils to pine.

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[PUBLIC RESOLUTION—No. 9]

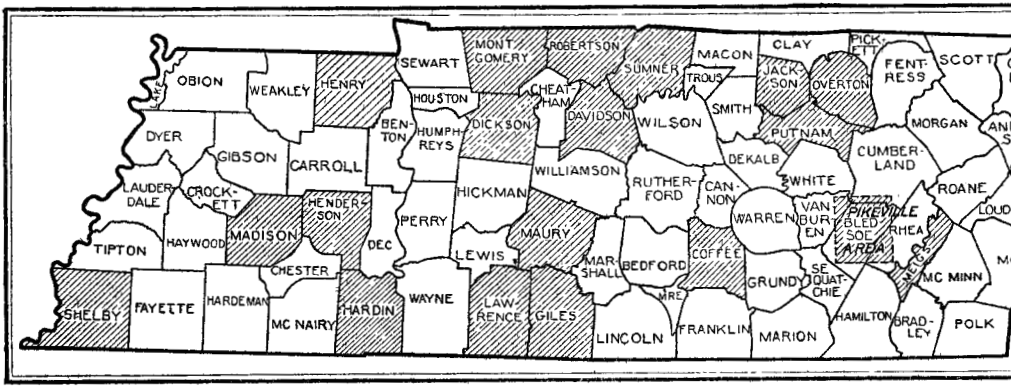
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided,* That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils, and on July 1, 1927, the Bureau of Soils became a unit of the Bureau of Chemistry and Soils.]



Areas surveyed in Tennessee, shown by shading

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U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF CHEMISTRY AND SOILS
HENRY G. KNIGHT, CHIEF
A. G. McCALL, CHIEF, SOIL INVESTIGATIONS
CURTIS F. MARBUT, IN CHARGE SOIL SURVEY

SOIL MAP

HARDIN COUNTY
TENNESSEE

TENNESSEE DEPARTMENT OF EDUCATION
DIVISION OF GEOLOGY
WALTER F. POND, STATE GEOLOGIST

CONVENTIONAL SIGNS

CULTURE
(Printed in black)

- City or Village, Roads, Buildings, Wharves, Jetties, Breakwater, Levee, Lighthouse, Fort
- Secondary roads and Trails
- Railroads Steam and Electric
- Bridges, Ferry
- R.R.crossings, Tunnel
- Ford, Dam
- School or Church Cemeteries
- Mine or Quarry Mine dumps Made land
- Bluff, Escarpment Rock outcrop and Triangulation station
- Stony and Gravelly areas
- Soil boundaries
- Boundary lines
- Boundary lines
- Boundary lines
- U.S.township and section lines

RELIEF
(Printed in brown or black)

- Contours Depression contours
- Prominent Hills Mountain Peaks
- Sand, Wash, and Sand dunes
- Shore and Low water line, Sandbar

DRAINAGE
(Printed in blue)

- Streams
- Lakes, Ponds, Intermittent lakes
- Intermittent streams
- Springs, Canals and Ditches, Flumes
- Swamp Salt marshes
- Submerged marsh Tidal flats

The above signs are in current use on the soil maps. Variations from this usage appear in some maps of earlier dates.

LEGEND

Baxter gravelly loam — Bg	Kalmia silt loam — Ks
Bibb very fine sandy loam — Bv	Lindside silt loam — Ls
Bibb silt loam — Bs	Ls — High phase
Cahaba fine sandy loam — Cf	Lindside silty clay loam — Lc
Cumberland silt loam — Cs	Lc — Low phase
Cuthbert very fine sandy loam — Cv	Luverne very fine sandy loam — Lv
Cv — Rolling phase	Ochlockonee very fine sandy loam — Ov
Elk silt loam — Es	Ochlockonee silt loam — Om
Fairmount silty clay loam — Fc	Oktibbeha silty clay loam — Oc
Guin gravelly sandy loam — Gg	Oc — Broken phase
Guin fine sandy loam — Gf	Oc — Greensand phase
Hagerstown silt loam — Hl	Pheba silt loam — Ps
Hardin fine sandy loam — Hf	Robertsville silt loam — Rl
Holly silt loam — Hm	Ruston gravelly fine sandy loam — Rg
Holly silty clay loam — Ho	Rg — Broken phase
Ho — High phase	Ruston fine sandy loam — Rf
Huntington fine sandy loam — Hy	Rf — Rolling phase
Hy — High phase	Savannah silt loam — Ss
Hy — Gravelly phase	Ss — Rolling phase
Huntington silt loam — Hs	Ss — Eroded phase
Hs — Dark brown phase	Ss — High phase
Hs — High phase	Susquehanna very fine sandy loam — Sv
Huntington silty clay loam — Hc	River wash — Rv
Rough stony land — Rs	

H. H. Bennett, Inspector, District 4.
Soils surveyed by W. J. Latimer, in charge, J. A. Kerr, A. L. Gray, J. W. Moon and A. W. Goke.

Scale 1 inch - 1 mile
1 4/5 0 1 2 3 4 Miles

WILLIAMS & HEINTZ CO. WASH. D.C.

Field Operations
Bureau of Soils
1926